FLOOD PLAIN INFORMATION

PLUM CREEK

CUYAHOGA AND LORAIN COUNTIES OHIO

PREPARED FOR

OHIO DEPARTMENT OF NATURAL RESOURCES

DIVISION OF PLANNING

FLOOD PLAIN MANAGEMENT SECTION

BY

CORPS OF ENGINEERS U.S. ARMY

BUFFALO DISTRICT

JUNE 1973

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A100 537
3. RECIPIENT'S CATALOG NUMBER	
4. TITLE *(and Subtitle)* 6 Flood Plain Information, Plum Creek, Cuyahoga and Lorain Counties, Ohio	5. TYPE OF REPORT & PERIOD COVERED 9 Final rept.
	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s)	8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Engineer District, Buffalo 1776 Niagara Street Buffalo, New York 14207	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Engineer District, Buffalo 1776 Niagara Street Buffalo, New York 14207	12. REPORT DATE Jun 1973
	13. NUMBER OF PAGES 43
14. MONITORING AGENCY NAME & ADDRESS *(if different from Controlling Office)*	15. SECURITY CLASS. *(of this report)*
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*

Distribution Unlimited

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Floods
Flooding

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

The purpose of this study is to collect and develop information on past and probable future floods associated with abnormal water flows. This information is for use by local authorities in further study, planning and action in eliminating or reducing future damages likely to be associated with the development of utilization of flood plain areas. With this data future development of such areas may be planned at elevations high enough to avoid flood damages or at lower elevations with recognition of the chance of hazards of flooding that exist. This report is based on hydrolog-

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ical facts. historical and recent flood heights. and technical date having a bearing on the occurence and magnitude of floods within the study area.

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INTRODUCTION

Flood plains exist primarily to temporarily convey and store flood flows which periodically exceed the capacity of the natural or man-made watercourses therein. They have also been an inviting but not always profitable or wise attraction for development by man. Advantages of waterborne transportation and commerce lead to early settlement along the river networks and the strong aesthetic attraction water holds for man has further encouraged encroachment into flood prone areas.

Where such development has occurred, floods threaten life, health and property and disrupt business among its other impacts on man's environment. An obvious solution to this problem is to exercise greater wisdom in the use of flood plains. However, such wisdom cannot be exercised unless there is adequate knowledge of the flood hazard potential and a will on the part of the users of flood plains to plan with the hazard in mind. Regulatory powers to affect sound land use in flood prone areas have not been used extensively until recent years. Because flood plains are attractive development sites, flood plain management practices cannot of themselves eliminate flood damages. But flood plain management practices can certainly reduce damages and should be given greater consideration by both planners and local governments. Consequently, the Flood Plain Management Services Program was developed within the Corps of Engineers to provide local governments with a better understanding of their flood problems and their effect on future growth and development. The program provides flood hazard information that may be used to develop land use regulations for guiding community growth.

This flood plain information report is for Plum Creek, beginning at its confluence with West Branch Rocky River in Olmsted Falls, Cuyahoga County and extending upstream to Crocker Road in Columbia Township, Lorain County. It has been prepared at the request of the Flood Plain Management Section of the Division of Planning of the State of Ohio Department of Natural Resources and will be distributed to local interests through this agency.

The purpose of this study is to collect and develop information on past and probable future floods associated with abnormal water flows. This information is for use by local authorities in further study, planning and action in eliminating or reducing flood hazards and in avoiding or reducing future damages likely to be associated with the development or utilization of flood plain areas. With this data, future development of such areas may be planned at elevations high enough to avoid flood damages or at lower elevations with recognition of the chance or hazards of flooding that exist.

This report is based on hydrological facts, historical and recent flood heights, and technical data having a bearing on the occurrence and magnitude of floods within the study area.

Included in this report are maps, profiles, photographs, and cross sections which indicate the extent of flooding that might occur in the future. If properly used, this information can be very beneficial in wise flood plain management. The maps, profiles and cross sections indicate the depth of probable flooding at any location which would result from the occurrence of either the Intermediate Regional Flood or the Standard Project Flood.

The report does not include plans for solutions of flood problems but provides the basis for further study and planning on the part of the local governments to arrive at solutions which will minimize future flood damages. This can be accomplished by local planning programs which guide essential development by controlling the type of land use in the flood plain through zoning, building codes, health regulations and other regulatory methods. Pamphlets and guides pertaining to flood plain regulations, flood proofing, and other related actions have been prepared by the Corps of Engineers. They are available to state agencies, local governments and citizens for planning and acting to reduce flood damage potential.

The Buffalo District of the Corps of Engineers will, upon request, provide technical assistance to federal, state and local agencies in the interpretation and use of the information contained within this report and will provide other available related flood data. Requests for technical assistance should be coordinated through the Ohio Department of Natural Resources, Division of Planning, Flood Plain Management Section, Fountain Square, Columbus, Ohio 43224.

SUMMARY OF FLOOD SITUATION

The reach of Plum Creek and flood plain area covered by this study begins at the stream's confluence with West Branch Rocky River at Olmsted Falls in Cuyahoga County. It extends a short distance through Olmsted Township to the Lorain-Cuyahoga County line and then through Columbia Township past Columbia Station to Crocker Road, a total distance of 9.8 miles. Plate 1 shows the location of Plum Creek and the length included in this study.

Past Flood Occurrences - There are no stream gaging stations or official records of past floods on Plum Creek. A thunderstorm type rainfall occurred over the area on September 17, 1972. Unofficial estimates of the rainfall from this storm vary up to about 10 inches in a four hour period. Interviews with local officials and residents in the area and a search of newspaper files disclosed a number of high water marks and photographic evidence of the magnitude of this flood which caused considerable damage and inconvenience to residents along Plum Creek in Columbia Township.

The U.S. Geological Survey calculated that the discharge from the September 17, 1972 storm was about 2,650 cubic feet per second at Usher Road.

From studies of possible future floods, the flood situation along the study reach has been developed and is summarized in the following paragraphs.

Intermediate Regional Flood - The Intermediate Regional Flood is a flood that has an average frequency of occurrence in the order of once in 100 years. It is the minimum flood normally recommended by the Ohio Department of Natural Resources to define the regulatory flood plain.

Standard Project Flood - The Standard Project Flood is a flood produced by the most severe combination of meteorological and hydrological conditions that is considered reasonably characteristic of the drainage basin under study. The elevation obtained from a flood of this magnitude is considered by the Corps of Engineers to be the upper limit of the flood plain.

Flood Damages - Within the study some development is occurring in the flood plain. It is the purpose of this report to provide local officials with the needed flood elevations and flooded area maps so that they can develop and adopt effective flood plain regulations to prevent unwise encroachment in flood prone areas. Columbia Township adopted a flood plain zoning ordinance in December, 1964. An occurrence of the Intermediate Regional Flood or Standard Project Flood in the study reach would cause damage to any development within the flooded area because of the depth of flooding and accompanying higher velocities

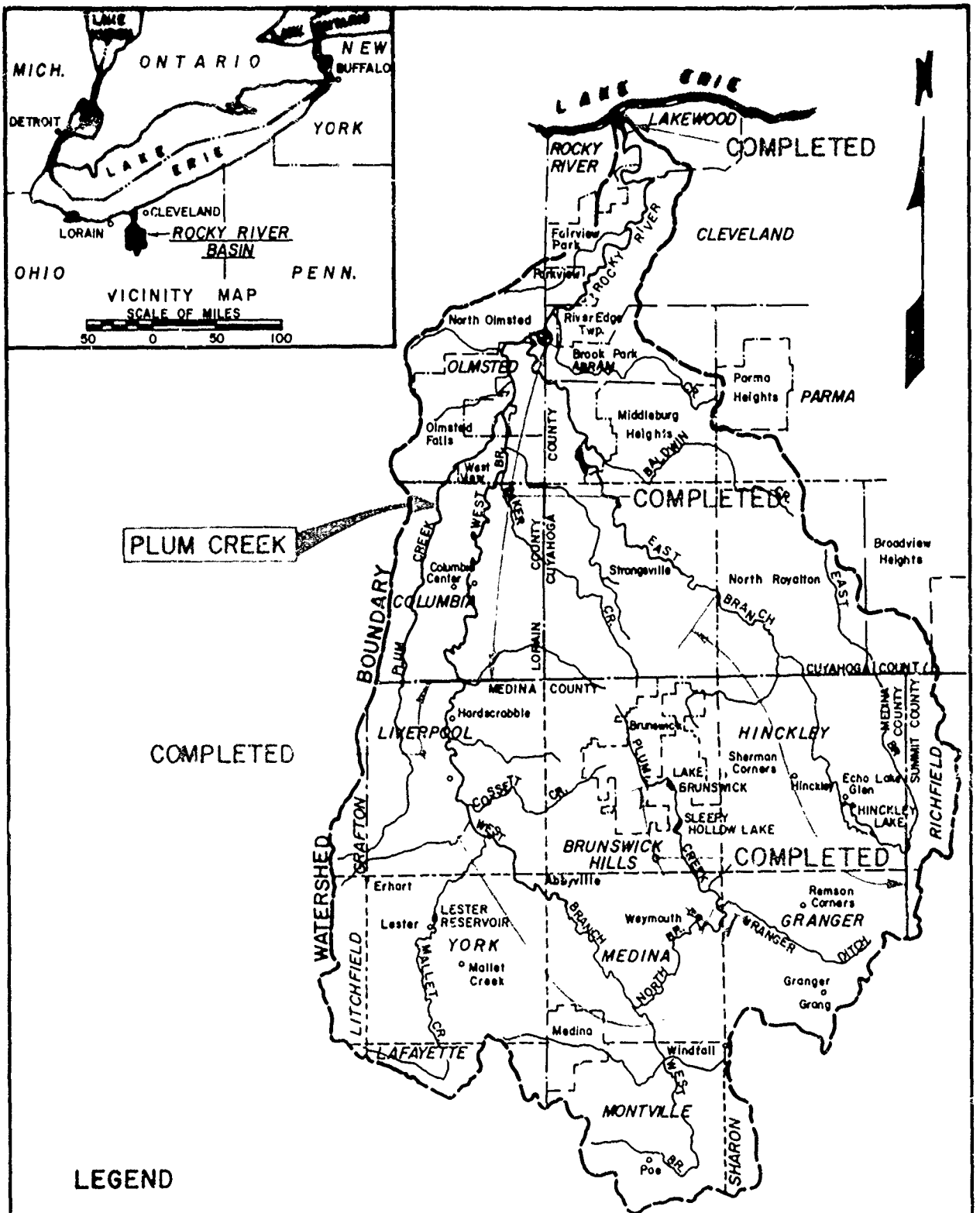
Main Flood Season - Major damaging floods have often been caused by melting snow coincident with moderate amounts of precipitation. Although damaging floods have and can occur at any time of the year, almost all instances of major floods have occurred in the late winter or early spring (January - April). Over smaller watersheds, such as Plum Creek, local thunderstorms also may cause damaging floods.

Flood Damage Prevention Measures - There are no existing or authorized flood control projects within the study area.

Possible Flood Heights - Flood levels that would be reached by the Intermediate Regional and Standard Project Floods are shown on table 2 in the text. The table gives a comparison of these flood levels with bridge floor, average underclearance and stream bed elevations at thirty bridge crossings. Water surface profiles for the Intermediate Regional Flood and the Standard Project Flood are shown on plates 5 and 6 and the flooded area on plates 3 and 4.

Velocities of Water - During an Intermediate Regional or Standard Project Flood, average channel velocities would vary from about two to six feet per second. Velocities greater than three feet per second combined with depths of three feet or greater are generally considered hazardous and dangerous to life and property.

Hazardous Conditions - Larger floods can cause hazards to local residents in many ways. Since most of the floods occur in the late winter and/or early spring, residents caught within the flood may suffer the discomfort from lack of heat for a number of days due to basement flooding which extinguishes furnace fires. Due to the duration and extent of flooding, health problems can develop when septic tanks are inundated and high water backs up sewer lines into basements. Municipal sewage treatment plants are often taxed beyond their capacities. Untreated discharge to floodways is made with consequent deposition of waste materials on stream banks and surrounding grounds. Flood waters which overtop roads can cause hazardous driving conditions. The danger from underestimating the velocity and depth of flood waters by unsuspecting children is an age old problem confronting residents within the flooded area.



PLUM CREEK
CUYAHOGA & LORAIN COUNTIES, OHIO
FLOOD PLAIN INFORMATION REPORT

BASIN MAP

U.S. ARMY ENGINEER DISTRICT BUFFALO

PLATE 1

GENERAL CONDITIONS AND PAST FLOODS

Description of the Area

Physical Setting - Plum Creek begins at its confluence with West Branch Rocky River 15.6 miles upstream of the mouth of Rocky River at Lake Erie. The study area extends upstream along Plum Creek from its confluence with West Branch Rocky River in Olmsted Falls, Cuyahoga County to Crocker Road in Columbia Township, Lorain County. The stream reach considered in this report and its location in the Rocky River basin are shown on plate 1.

Plum Creek flows generally from south to north over its 14.8 mile length, of which the downstream 9.8 miles are examined in this report. The stream rises 243 feet over its length from an elevation of 707 feet above msl at its mouth to 950 at its source in Grafton Township, Medina County. This results in an average slope of 16.4 feet per mile. However, between Columbia Road and Crocker Road, a distance of 9.2 miles, the average slope is only 8.3 feet per mile. Through the falls downstream from Columbia Road to the mouth, the average slope is 150 feet per mile in 0.2 miles

Rocky River drains 293 square miles of which 17.7 are the Plum Creek tributary watershed. Data pertaining to this and other drainage areas within the Rocky River basin are presented in table 1.

Settlement - Settlement of Columbia Township began in 1807 on the Rocky River. The first settlers journeyed from Waterbury, Connecticut to Cleveland, Ohio and then spent eight days cutting a trail to Columbia Township. In 1808 Calvin Hoadley came to Columbia Township and in 1809 he built a grist mill on Rocky River south of the center of the township Lemuel Hoadley, Calvin's father, built most of the mills in this region. In 1819 he moved to Olmsted Township and constructed a sawmill on West Branch Rocky River Then, in 1832 he built another sawmill at the mouth of Plum Creek.

Olmsted Township was first settled by James Green in 1814. After 1819 settlers arrived more rapidly and it was during this period that the Hoadley mills were built In 1823 a civil township by the name of Lenox was formed. However in 1825 the lands were divided between Middleburg and Ridgeville. Two years later the west half was returned to Cuyahoga County During this period Watrous Usher constructed the first sawmill in Olmsted Falls

Until 1829 this township continued to be called Lenox Upon the death of Aaron Olmsted a present of a library was offered to the people if they agreed to change the name of the township to Olmsted

In 1849 the Cleveland, Columbus, and Cincinnati Railroad was constructed through the southeast part of Olmsted Township where a depot was located in Olmsted Falls In 1853

TABLE 1

DRAINAGE AREAS WITHIN THE ROCKY RIVER BASIN

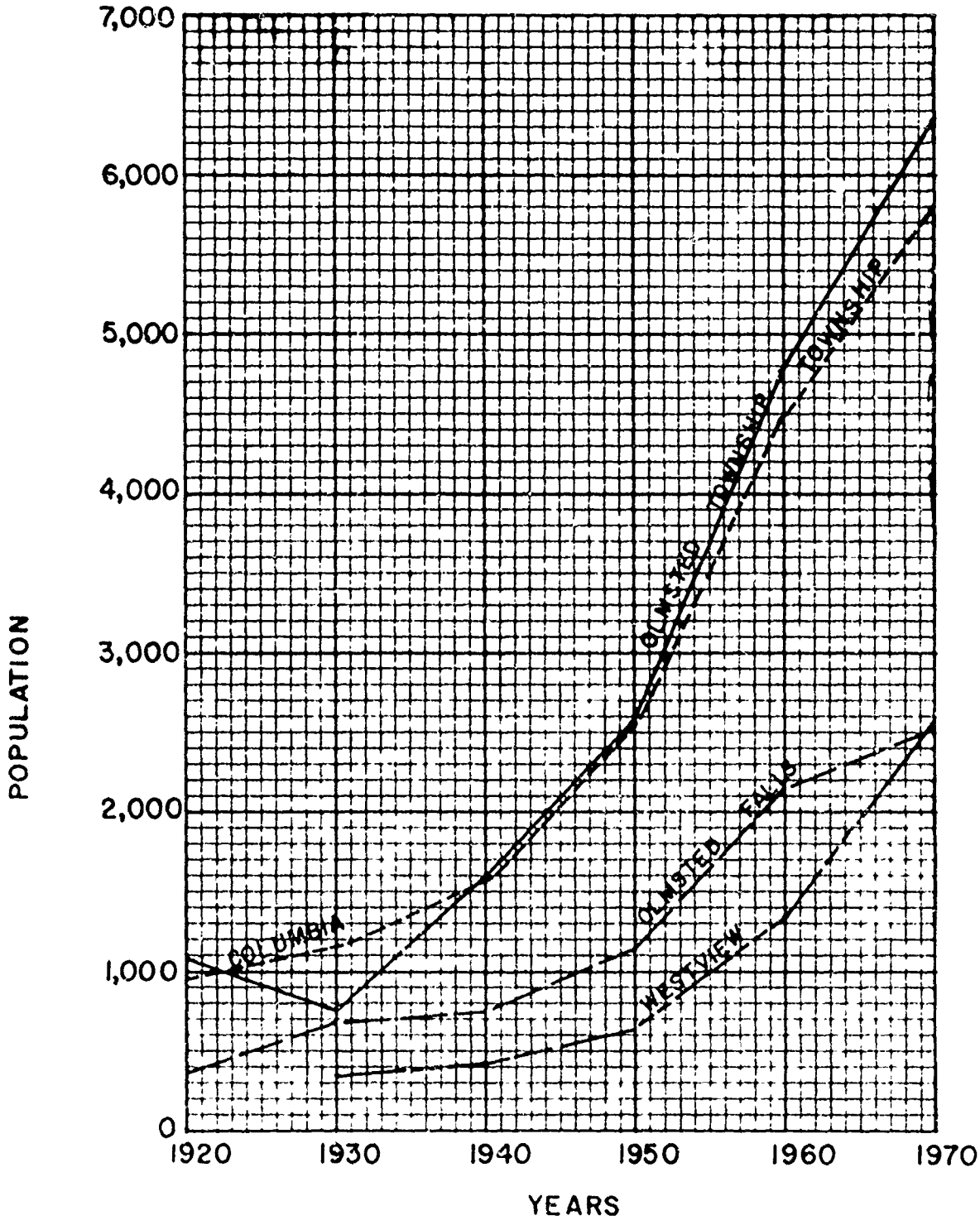
Location	Distance Upstream at Mouth, Miles	Drainage Area, Square Miles	
		Tributary	Main Stem
Main stem at mouth	0.0		293
Abrams Creek	10.7	10.2	279
Main stem upstream of Abrams Creek			268
Main stem at gage	12.4		267
East Branch at mouth	12.45	76.9	267
Baldwin Creek	17.7	10.0	74.2
East Branch upstream of Baldwin Creek			64.1
West Branch at mouth	12.45	190	267
Plum Creek	15.6	17.7	179
West Branch upstream of Plum Creek			161
Mallet Creek	32.5	18.1	105
West Branch upstream of Mallet Creek			87.4
North Branch at mouth	41.5		61.1
Plum Creek		12.9	28.1
North Branch upstream of Plum Creek (Granger Ditch)			15.2

the Toledo, Norwalk and Cleveland Railroad was constructed and the village of West View grew up around the depot.

In 1856 Olmsted Falls incorporated under this name and in 1857 the village of Plum Creek was annexed making a very large area in proportion to the population. At this time West View was a smaller village containing a store, two or three shops and about 30 homes.

Population - Population trends are shown on figure 1 for the four political subdivisions within the study area. Three of these are within Cuyahoga County and Columbia Township is in Lorain County. The population in Columbia Township is generally scattered throughout the township although there are small concentrations at Columbia Station and Columbia Center.

Until recently the populations of Olmsted Falls and West View have been nearly parallel with Olmsted Falls being the larger of the two. In spite of a significant decrease in the population between 1920 and 1930 of Olmsted Township as a result of annexation into Olmsted Falls, the township has shown a much greater growth rate than either Olmsted Falls or West View. In fact the gross population of both communities is less than the township total. The effects of flooding however would be much more significant in the communities than in the township since a greater portion of the population resides within the flood plain.



POPULATION TRENDS

FIGURE 1

Factors Affecting Floods and Flood Damages

Channel Conditions and Development - In the lower reaches of Plum Creek above its confluence with West Branch Rocky River, the stream is confined between steep rocky banks as shown in figure 2, with some trees and growth. A falls section, see figure 3, occurs between the Columbia Road and Penn Central Railroad bridges, with the stream channel in bedrock.

At about Columbia Road, shown in the background in figure 3, some residential development occurs along the overbank areas adjacent to the stream. Stream banks are not so steep or high above the Penn Central Railroad crossing with overbank areas more open, as shown in figures 4 and 5. Further upstream at valley cross section 2, the stream channel is partially obstructed with fallen trees and the overbanks overgrown with trees and brush, see figures 6 and 7.

In Olmsted Township, Plum Creek forms the westerly corporate boundary of West View. Figure 8 shows the stream banks with scattered larger trees and adjacent open overflow areas near Usher Road about 1,000 feet south of where the power lines cross the stream. At the Usher Road Bridge, the stream banks are more overgrown with trees and brush as shown in figure 9. There is some residential and commercial development along the reach in Olmsted Township.

Through Columbia Township in Lorain County there is generally less development along Plum Creek than occurs downstream in Cuyahoga County. Figure 10 shows the more open farmland along Jaquay Road about 2,000 feet south of Sprague Road. Upstream from Nichols Road the stream channel, banks and overbank areas are densely grown up with smaller trees and brush, see figure 11.

Along Folley Road east of Plum Creek there is residential development within the flood plain Further upstream at Columbia Station along Royalton Road and particularly along Plum Creek Drive there are a number of homes in the low overbank areas that are subject to flooding. Downstream from Royalton Road, see figure 12, the stream banks are covered with small trees and dense growth. Fallen branches and smaller growth extend into the channel itself creating a further obstruction to flow. Above Royalton Road the banks are also tree covered and grown up with brush as shown in figure 13.

The reach of Plum Creek upstream from Columbia Station to Crocker Road at the Lorain-Medina County line is generally undeveloped except along Station Road where a few homes are within the flood plain Above Akins Road Bridge, figure 14, the channel banks are grown up with small trees and some brush but overbank areas are open At the upstream limit of the study the stream channel banks and overbank areas are grown up with weeds, brush and smaller trees as shown in figure 15

FIGURE 2 — Steep rocky stream bank with some trees and growth looking downstream from Main Street bridge at stream mile 0 09

FIGURE 3 — Falls section of Plum Creek in bedrock looking upstream from about stream mile 0 20 to Columbia Road bridge in background

Channel conditions in Olmsted Falls
Photos taken April 1973

FIGURE 4 — Cleared channel banks and overbank areas looking downstream from Mill Street bridge at stream mile 0.40.

FIGURE 5 — Less steep stream banks and open overbank areas looking downstream from Bagley Road bridge at stream mile 0.54

Channel conditions in Olmsted Falls
Photos taken April 1973

FIGURE 6 — Fallen trees and growth in stream channel looking upstream at stream mile 0 95

FIGURE 7 — Dense growth and trees on overbank at stream mile 0 95

Channel conditions at Valley Section 2 in Olmsted Falls
Photos taken April 1973

FIGURE 8 — Scattered trees and cleared overbanks looking upstream by Usher Road at stream mile 2 65

FIGURE 9 — Dense growth and small trees along stream bank looking downstream from Usher Road bridge at stream mile 2 65

Channel conditions in Olmsted Township
Photos taken November 1972

FIGURE 10 — Open farmland along Plum Creek near Jaquay Road at stream mile 3.87

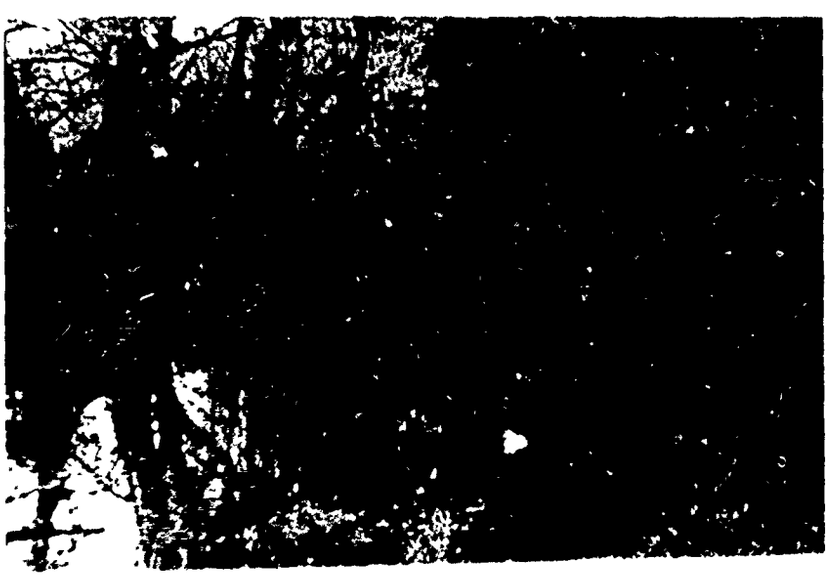


FIGURE 11 — Dense growth and trees along stream looking upstream from Nichols Road bridge at stream mile 5 68

Channel conditions in Columbia Township
Photos taken November 1972

FIGURE 12 — Partially clogged channel and dense growth along banks looking downstream from Royalton Road bridge at stream mile 6 79

FIGURE 13 – View of trees and brush along channel banks looking upstream from Royalton Road bridge at stream mile 6 79

Channel conditions in Columbia Township at Columbia Station
Photos taken November 1972

FIGURE 14 — Looking upstream from Akins Road bridge at stream mile 8 56 the stream banks are overgrown with brush and small trees but overbank areas are open

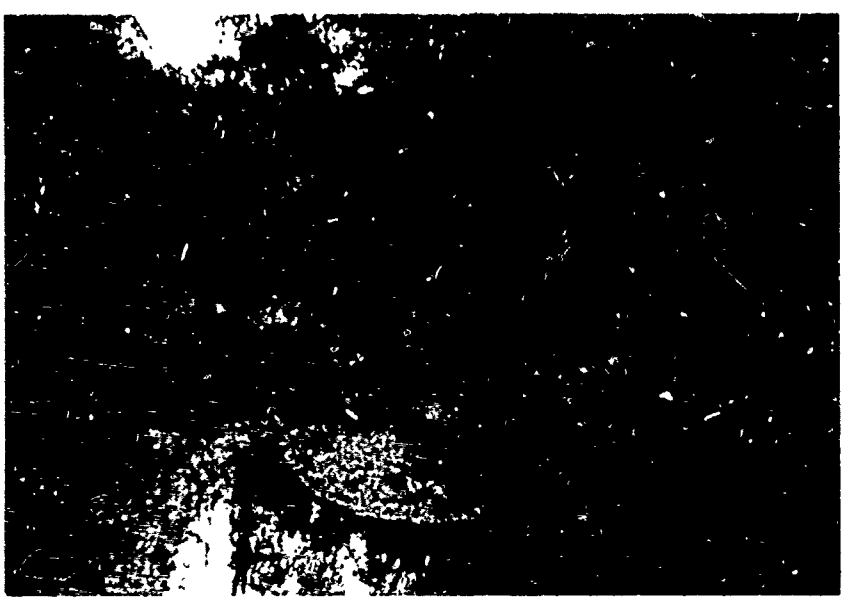


FIGURE 15 — Dense growth of weed brush and small trees along banks and overbank areas looking downstream from Crocker Road bridge at stream mile 9 77

Channel conditions in Columbia Township
Photos taken November 1972

Obstructions to Flood Flow - Inadequate waterway openings under bridges, and dams and other encroachments and fills in channel and overbank areas are major obstructions to passage of flood flows. Other serious obstructions are bends and irregularities of the channel, heavy brush, weeds and trees on the channel banks and overbank areas and growth and debris extending into the channel.

Along Plum Creek a principal obstruction to flow is the dense growth of brush and trees along the stream channel. This type obstruction can be minimized by a channel maintenance and cleanup programs. A concentrated effort should be made to prevent throwing of refuse or litter into the stream or along the banks. Within the floodway, which is the overbank area and stream channel reasonably required to convey the 100-year frequency flood, should be kept free of obstructions that would interfere with flows and increase flood heights. Floods have occurred in the past and they will undoubtedly occur again. A floodway provides room for flood flows when they come.

Bridges - Thirty-three bridges cross Plum Creek within the study reach. Of these eight are footbridges, eight private road bridges, two railroad bridges and fifteen public highway bridges. Because of their condition, type construction and/or elevations, it was assumed that four of the footbridges would wash out during flood flow and were therefore neglected in the analysis.

All of the bridges obstruct flood flow but the two railroad bridges greatly obstruct flow. Figure 16 shows the Penn Central crossing at Olmsted Falls. One of the better constructed footbridges is shown in figure 18. Figures 17 and 19 through 23 show some of the major highway bridges throughout the study area.

Table 2 lists a comparison of pertinent bridge structure elevations to the Intermediate Regional and Standard Project Flood elevations. Only the twenty-eight bridges considered in the analysis are listed in the table or shown on the profile sheets, plates 5 and 6.

Flood Warning and Forecasting Services - Presently there are no specific flood warning or forecasting services for Plum Creek. However, the study area is well within the effective range of the Weather Surveillance Radar operated continuously by the U.S. Weather Service at the Cleveland and Akron-Canton Airport Stations. Weather Service equipment provides for the early detection of a storm and makes possible immediate radio and television broadcasts of information concerning the predicted path and amount of rainfall.

Existing Regulations - In Ohio, the power to adopt and enforce zoning regulations is delegated to political subdivisions The enabling statutes are within Chapters 303, 519, and 713 of the Ohio Revised Code. Olmsted Township, Olmsted Falls, and West View have yet to adopt specific flood plain zoning regulations

FIGURE 16 — Penn Central Railroad bridge crossing in Olmsted Falls at stream mile 0.32, looking downstream at the upstream face of the bridge arch

Railroad Bridge Crossing
Photo taken November 1972

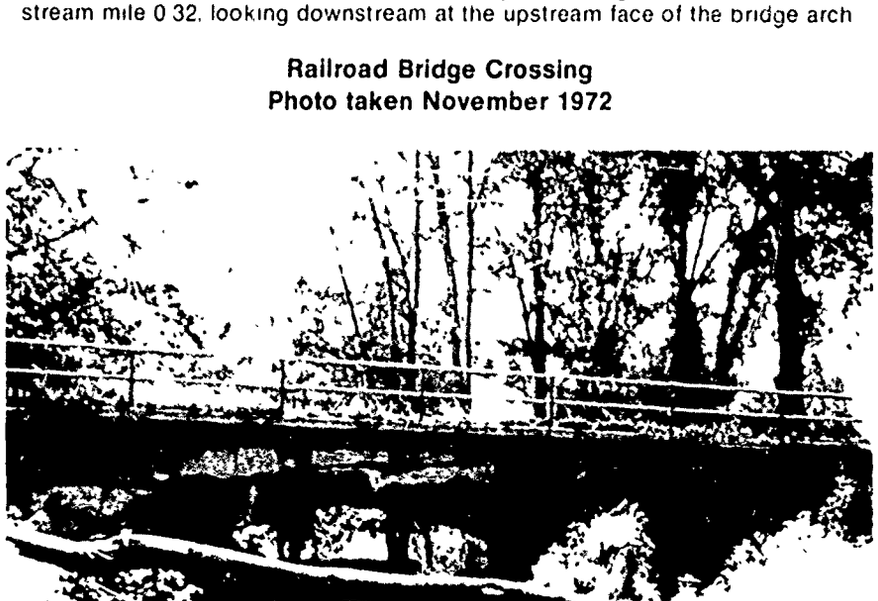


FIGURE 17 — Bagley Road bridge in Olmsted Falls at stream mile 0.54 looking upstream at the downstream face of the bridge

Highway Bridge
Photo taken July 1973

FIGURE 18 — Footbridge above Bagley Road at stream mile 0.56, looking upstream

Footbridge in Olmsted Falls
Photo taken April 1973

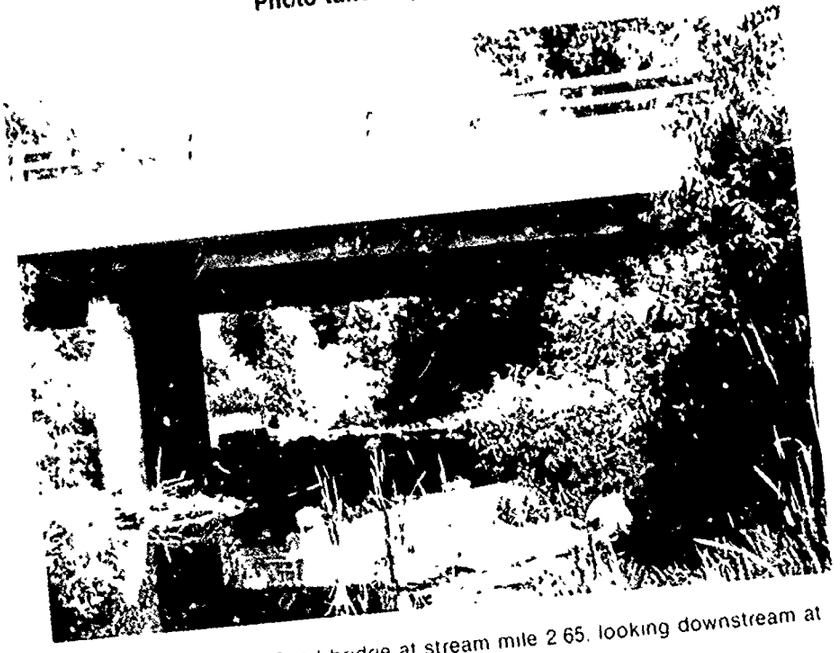


FIGURE 19 — Usher Road bridge at stream mile 2.65, looking downstream at upstream face

Highway bridge
Photo taken July 1973

FIGURE 20 — Sprague Road bridge at stream mile 3.43, looking downstream at upstream face

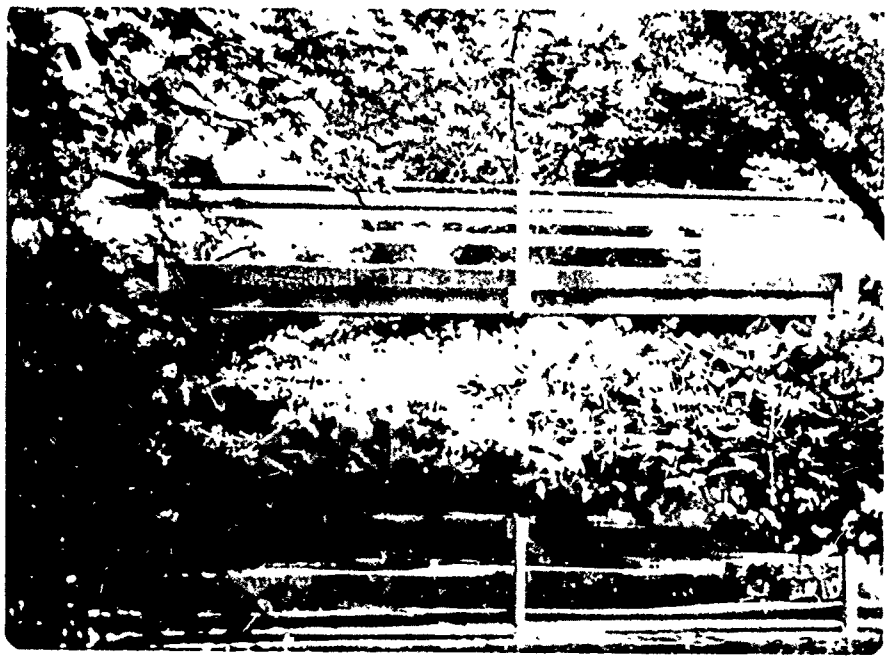


FIGURE 21 — Jaquay Road bridge at stream mile 4.91 looking downstream at upstream face

Highway bridges
Photos taken July 1973

FIGURE 22 — Folley Road bridge at stream mile 6.26, looking upstream at downstream face

FIGURE 23 — Royalton Road bridge at stream mile 6.79 looking downstream at upstream face

Highway bridges
Photos taken July 1973

On December 21, 1964, Columbia Township adopted a flood plain map and zoning ordinances to restrict the use of the flood plain on Plum Creek and Rocky River through Columbia Township. The regulations restrict the use of the flood plain to only agricultural and public and private park and recreation facilities. Validity of these flood plain ordinances was established finally in court when the Ohio Supreme Court, in 1971, declined to review a lower court ruling upholding the zoning.

The General Assembly of Ohio passed an amendment to House Bill No. 314 which requires all departments and agencies of the state to notify and furnish to the Division of Water information on state facilities which may be affected by flooding. This information is required in order to avoid the uneconomical, hazardous, or unnecessary use of flood plains in connection with state facilities. The amendment further requires that where economically feasible, departments and agencies of the state and political subdivisions responsible for existing publicly owned facilities, provide flood proofing measures in order to reduce potential flood damage.

Under Executive Order 11296, the federal government has similar restrictions in that all federal agencies directly responsible for the construction of federal facilities must evaluate flood hazards when planning the location of new facilities. In addition, this order requires that federal agencies responsible for administering federal grants, loans or mortgage insurance programs evaluate flood hazards in order to minimize potential flood damage and the need for possible future federal expenditures for flood protection and flood disaster relief.

Aid to Flood Victims - The Disaster Relief Act of 1970 (Public Law 91-606) provides assistance to communities and persons located in flood hazard areas in the event of a declared major disaster. The Act provides for various types of aid prior to, during, and after the disaster.

The National Flood Insurance Act of 1968 (Public Law 90-448) provides federally-subsidized, low-cost flood insurance to property owners in any community that meets the eligibility requirements. In order to obtain flood insurance eligibility, the localities involved must adopt various land use controls and regulations affecting flood plains.

Record Flood Descriptions

Detailed data on historic floods on Plum Creek is not available since there are no stream gaging stations on the stream. Information from residents and newspaper articles did provide data on a recent past flood which occurred on September 17, 1972 and resulted in contamination of water supplies as well as damages to homes. The extent of flooding is expressed in part by the following excerpts from an Elyria, Ohio newspaper.

The Chronicle - Telegram
Elyria, Ohio, Tuesday, September 18, 1972

"Homes flooded, water contaminated"
"COLUMBIA IS DELUGED BY 10 INCHES OF RAIN"

"COLUMBIA - Township residents and Civil Defense personnel today are wading through the aftermath of yesterday's thunderstorm, which dumped up to 10 inches of rain and caused contamination of the township's water supply.

"The storm, which entered the area about 5 p.m., caused severe flooding of basements and grounds and forced closing of roads in the township as well as other adjoining areas.

"Civil Defense officials expressed concern today over a National Weather Service forecast for more rain late this morning.

" 'If we get two more inches of rain, we are in deep trouble,' said Joseph Koch, Lorain County Civil Defense Director.

"Koch and Civil Defense officials were called to the township last night after an appeal from Township Trustee Art Rundle for assistance.

"The Plum Creek Road area south of Rt. 82 appeared the hardest hit in the flooding as houses were surrounded by up to five feet of water. According to one resident, several families had to be evacuated by boat

"THE 10-TO 12-INCH report of rain in Columbia announced by the weather service earlier today is unofficial, according to a weather service spokesman.

"Earlier this summer the Plum Creek Road area experienced heavy flooding, but, according to a resident, it never reached the proportions it did yesterday.

"Mrs. Grace Cole, of 12902 Root Rd., said she has never seen a storm so severe in Columbia in her more than 70 years.

"Columbia schools were closed today, but were expected to resume classes tomorrow.

"Roads in the township were impassable in some spots and some motorists were stranded for hours before they could be reached by rescue officials."

Photographs of flooding along Plum Creek Drive and Royalton Road in Columbia Station are shown in figures 24 and 25.

The U.S. Geological Survey estimated a discharge of 2,650 cubic feet per second at Usher Road bridge for this flood. Based on this, the flood of September 17 approximated a 100-year frequency flood discharge.

In preparation of this report, a survey was conducted by Corps personnel to gather information from local citizens on high water marks resulting from the September 17 flood. The reported high water marks are shown on plates 5, 6 and 7.

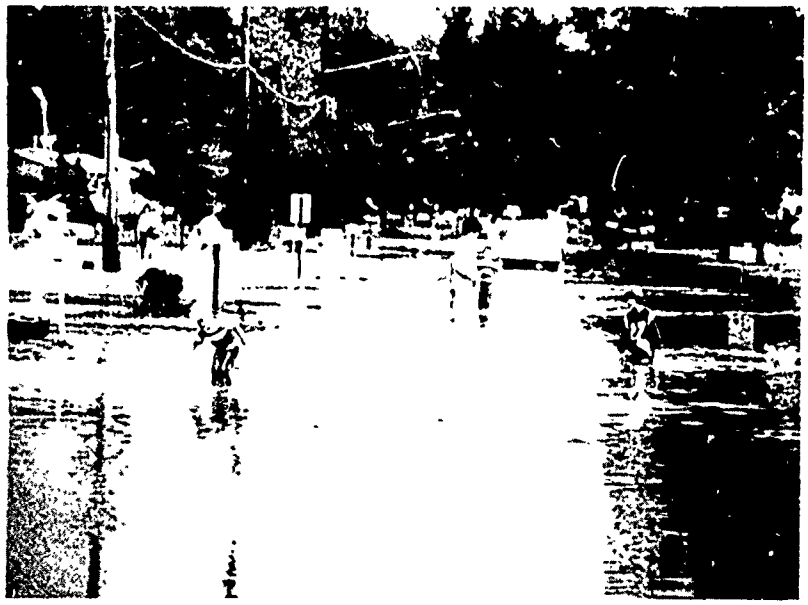


FIGURE 24 — Plum Creek Drive looking south. Courtesy The Chronicle - Telegram.

FIGURE 25 — Residence at 26798 Royalton Road Courtesy E J Eury

September 17, 1972 flood at Columbia Station

FUTURE FLOODS

Great floods have been experienced on streams in the general geographical region of this study. Similar climatological conditions to those causing such large floods could occur over the Plum Creek watershed and, in all probability, will occur sometime in the future. The purpose of this section is to delineate those areas that would be inundated by floods of a given magnitude and set forth additional information to help communities develop a plan for reducing the extent of future flood damages.

Extent of Flooding

Intermediate Regional Flood - The Intermediate Regional Flood is defined as a flood having a recurrence interval of once in 100 years at a designated location. However, this is based on a statistical analysis and the flood may actually occur in any year or even in consecutive years. Data for this flood on Plum Creek is shown in table 3. The Intermediate Regional Flood is recommended by the State of Ohio Department of Natural Resources as the minimum flood level to define the limits of the regulatory flood plain. That is, development within these limits should be regulated by local ordinances so as to reduce flood damage potential.

Standard Project Flood - The Corps of Engineers, with the cooperation of the National Weather Service, has made broad and comprehensive studies and investigations of experienced storms and floods and has developed generalized procedures for estimating the flood potential of streams. These procedures have been used in determining the Standard Project Flood, which is defined as the largest flood that can be expected from the most severe combination of meteorological and hydrological conditions that are considered reasonably characteristic of the geographical region involved. Only in rare instances would such a storm occur on any specific region.

There is no frequency assigned to this flood since it is developed from rainfall data rather than streamflow records. The occurrence of such a flood would indeed be a rare event however, it could occur in any year. This flood is not the maximum flood that could occur, but it does indicate a reasonable upper limit of the flood plain.

Larger Floods - While larger floods are theoretically possible, the usual climatological characteristics required to produce such a flood would seldom exist. The minimum risk from possible future flood damages that a community is willing to accept should be considered in establishing regulatory flood plain limits or planning for development.

Areas and Depths of Flooding - Areas that would be flooded by the Intermediate Regional and Standard Project Floods are delineated on plates 3 and 4. An index map of the vicinity is shown on plate 2. The overflow areas were determined with an accuracy consistent

TABLE 3

INTERMEDIATE REGIONAL AND STANDARD PROJECT FLOOD DISCHARGES AND AVERAGE VELOCITIES

Stream Mile	Discharge, cfs	Average Velocity, feet per second	
		Channel	Overbank
	Intermediate Regional Flood		
0.00-2.17	2,760	3.3	1.5
2.17-4.38	2,600	3.6	1.7
4.38-5.96	2,430	0.9	0.7
5.96-6.60	2,210	1.8	1.4
6.60-7.40	2,020	3.5	1.3
7.40-7.99	1,760	5.3	2.0
7.99-9.80	1,730	2.5	1.3
	Standard Project Flood		
0.00-2.17	3,560[1]	3.3	1.6
2.17-4.42	3,070[1]	3.6	1.7
4.42-5.96	7,120	1.1	1.1
5.96-6.60	6,460	2.3	2.1
6.60-7.40	5,920	3.3	1.8
7.40-7.99	5,160	6.5	2.9
7.99-9.80	5,060	3.4	2.4

[1]Decreased discharge reflects the loss of flow over the divide from the Plum Creek watershed to West Branch Rocky River.

with the objectives of the study and accuracy of available data. Actual limits of the flooded areas may vary somewhat from those shown on the map because the 10-foot contour interval and scale of the map do not permit precise plotting of the flooded area boundaries.

Plates 5,6 and 7 show the water surface profiles for both floods. The depth of flow in the channel can be estimated at any point from these plates. Determination of these flood profiles was predicated on the assumption that all structures except four footbridges would remain in place throughout the flood and that no accumulation of debris would further restrict waterway openings or block the channel.

The lateral extent of channel overflow at typical cross sections is shown on plates 8, 9 and 10. Depth of flow outside of the channel resulting from either flood can be estimated from these illustrations.

Approximate depths of flooding that would be experienced within the flood plain of Plum Creek covered by this report by the occurrence of the Intermediate Regional Flood and the Standard Project Flood are shown in figures 26 through 30 inclusive.

FIGURE 26 — Arrows indicate heights of the Standard Project and Intermediate Regional Floods at Jaquay Road bridge, stream mile 4.91.

FIGURE 27 — Residence on Nichols Road about 50 feet west of bridge at stream mile 5.68. Arrows show the heights of Standard Project and Intermediate Regional Floods.

Possible future flood heights
Photos taken May 1973

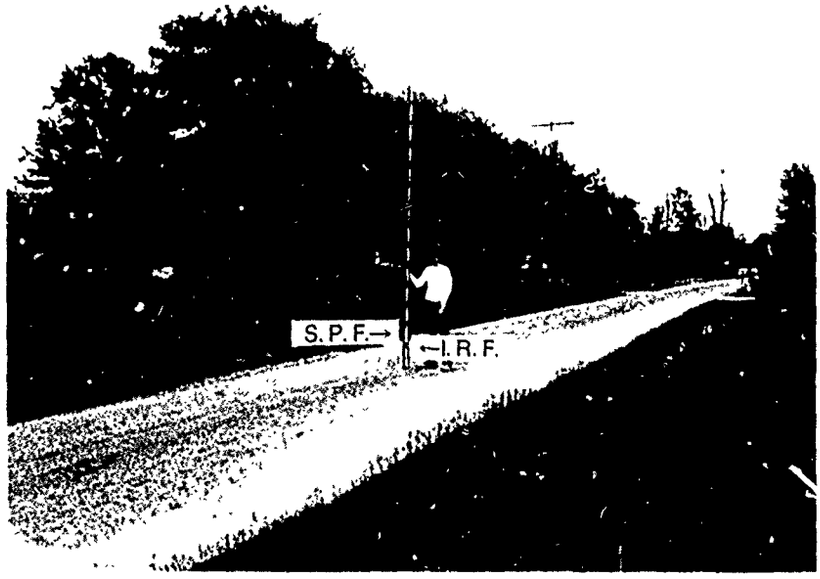


FIGURE 28 — Heights of the Standard Project and Intermediate Regional Floods are shown by the arrows at Folley Road, stream mile 6.26. View is looking east about 200 feet east of the bridge

FIGURE 29 — Arrows indicate heights of the Standard Project and Intermediate Regional Floods at Plum Creek Drive in Columbia Station, stream mile 6.93

Possible future flood heights
Photos taken May 1973

FIGURE 30 — Heights of flooding at Crocker Road bridge, stream mile 9.77, are shown by the arrows for the Standard Project Flood and Intermediate Regional Flood.

Possible future flood heights
Photo taken May 1973

Velocity of Flood Waters - Average velocity of flood waters depends on the size and shape of the cross section, conditions of the stream and the bed slope of the channel, all of which vary along the stream. Table 3 lists the average velocities that may be expected for a discharge of each flood. Velocities greater than three feet per second combined with depths of three feet or greater are generally considered hazardous to life and property.

The accumulation of ice or debris at constricted sections of the channel may affect the characteristics of flood flow. Such accumulation acts as a dam and causes water to back up forming a pond. If sufficient head accumulates to break the dam, a surge of water would flow downstream causing an increase in both the discharge and velocity values. Since the occurrence and amount of accumulation are indeterminate factors, the values in table 3 do not reflect such conditions.

Reducing the Damages

The information contained in this report will not by itself reduce the flood damage potential. Local action will be required to implement a flood plain management program in order to curb the rise of potential flood damages. Although specific plans are not set forth for the study area, several agencies provide assistance to the local sector in developing a workable plan for reduction of flood damages and wise use of the flood plains.

State Assistance - The Flood Plain Management Section of the Division of Planning of the Ohio Department of Natural Resources administers Ohio's flood plain management program. The major objective of the program is to ensure the wise use of Ohio's flood plain areas. They perform various functions including collection of flood data, special analysis of flood hazard sites, and development of model ordinances and regulations for flood plain use.

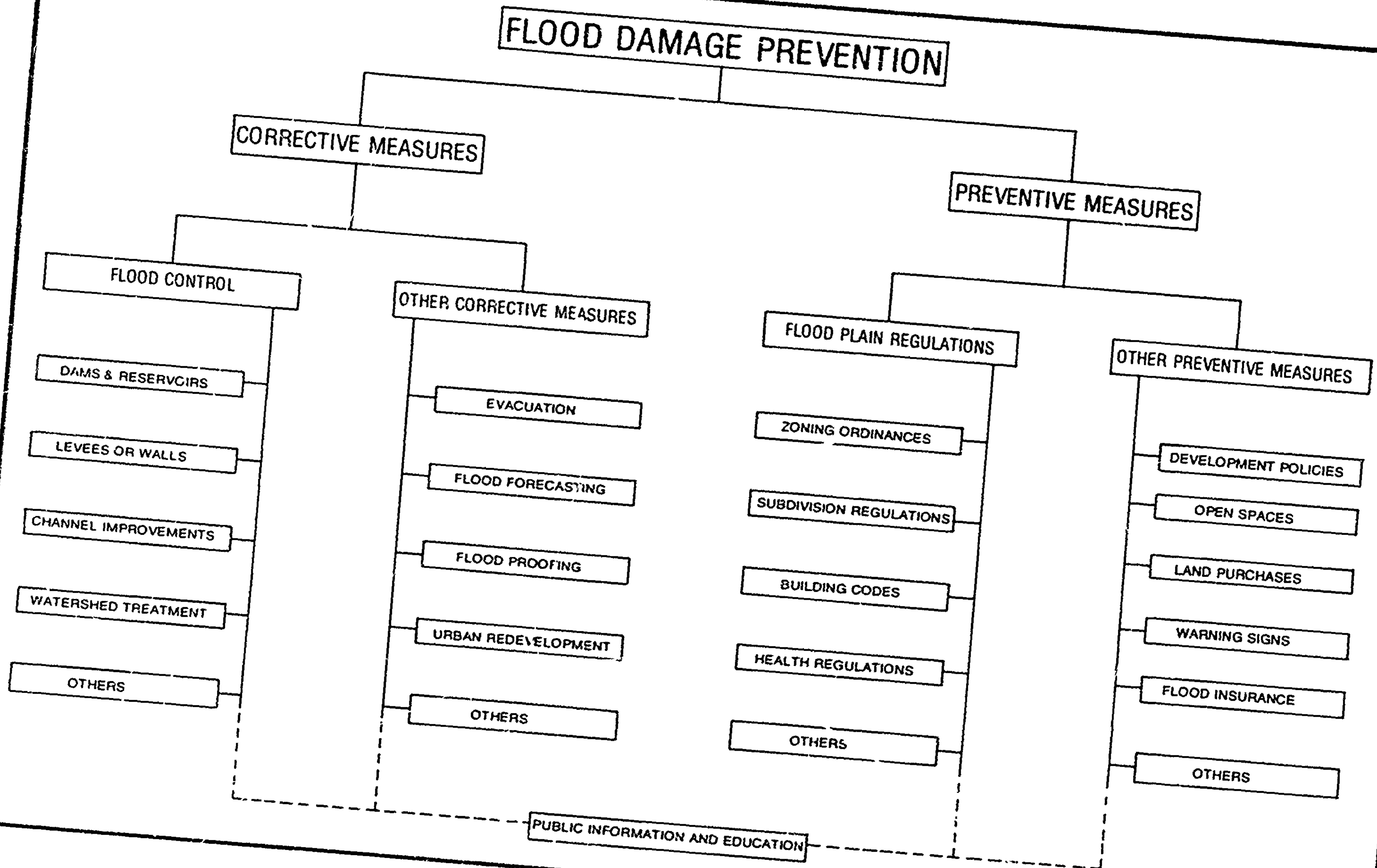
This program is directed at the local level since the power to control the use of flood plains lies with the local governments in Ohio. Technical data and planning assistance is provided to local communities requesting help. The Flood Plain Management Section is also the State Coordinating Agency for the National Flood Insurance Program. Information is provided on the insurance program and local communities are assisted in establishing eligibility for flood insurance.

Federal Assistance - The Department of Housing and Urban Development administers the National Flood Insurance Program. Currently none of the communities in the study area are eligible. Both the U.S. Soil Conservation Service and U.S. Geological Survey are active in and coordinate flood control programs with the state.

The Corps of Engineers also maintains a Flood Plain Management Services program. Information, guidance and advice on flood hazards and the wise use of flood plains are available to federal, state and local agencies. The program includes preparation of this

and other flood plain information studies and provision of technical assistance for the collection, preparation, and analysis of flood data. Guidelines and pamphlets pertaining to flood plain regulations, flood proofing, and other related subjects are available to public and governmental interests. Comprehensive flood damage prevention planning is also available through this program.

To assist local governments in managing and controlling their flood plains, the U.S. Army Corps of Engineers has prepared and will, upon request, distribute to state, county, and local governments copies of pamphlets entitled, "Guidelines for Reducing Flood Damages" and "Introduction to Flood Proofing." These pamphlets together with information presented in this report should provide a base upon which local governments may develop a sound program to reduce damage to existing and future development within the flood plain of Plum Creek in Cuyahoga and Lorain Counties, Ohio. Figure 31 lists the corrective and preventive measures described in the above mentioned pamphlets. The U.S. Army Corps of Engineers will distribute to state, county, and local governments other helpful pamphlets as well as additions to existing pamphlets as they are developed.



Flood damage prevention measures

FIGURE 31

GLOSSARY OF TERMS

Discharge. The quantity of flow in a stream at any given time, usually measured in cubic feet per second (cfs).

Flood. An overflow of lands not normally covered by water and that are used or usable by man. Floods have two essential characteristics: The inundation of land is temporary; and the land is adjacent to and inundated by overflow from a river or stream or an ocean, lake, or other body of standing water.

Normally a "flood" is considered as any temporary rise in streamflow or stage, but not the ponding of surface water, that results in significant adverse effects in the vicinity. Adverse effects may include damages from overflow of land areas, temporary backwater effects in sewers and local drainage channels, creation of unsanitary conditions or other unfavorable situations by deposition of materials in stream channels during flood recessions, rise of ground water coincident with increased streamflow, and other problems.

Flood Crest. The maximum stage or elevation reached by the waters of a flood at a given location.

Flood Peak. The maximum instantaneous discharge of a flood at a given location. It usually occurs at or near the time of the flood crest.

Flood Plain. The relatively flat area or low lands adjoining the channel of a river, stream or watercourse or ocean, lake, or other body of standing water, which has been or may be covered by flood water.

Flood Profile. A graph showing the relationship of water surface elevation to location, the latter generally expressed as distance above mouth, for a stream of water flowing in an open channel. It is generally drawn to show surface elevation for the crest of a specific flood, but may be prepared for conditions at a given time or stage.

Flood Stage. The stage or elevation at which overflow of the natural banks of a stream or body of water begins in the reach or area in which the elevation is measured.

Head Loss. The effect of obstructions, such as narrow bridge openings or buildings that limit the area through which water must flow, raising the surface of the water upstream from the obstruction.

Hydrograph. A curve denoting the discharge or stage of flow over a period of time.

Intermediate Regional Flood. A flood having an average frequency of occurrence in the order of once in 100 years although the flood may occur in any year. It is based on statistical analyses of streamflow records available for the watershed and analyses of rainfall and runoff characteristics in the "general region of the watershed."

Left Bank. The bank on the left side of a river, stream, or watercourse, looking downstream.

Low Steel (or Underclearance). See "underclearance."

Right Bank. The bank on the right side of a river, stream, or watercourse, looking downstream.

Standard Project Flood. The flood that may be expected from the most severe combination of meteorological and hydrological conditions that is considered reasonably characteristic of the geographical area in which the drainage basin is located, excluding extremely rare combinations. Such floods, as used by the Corps of Engineers are intended as practicable expressions of the degree of protection that should be sought in the design of flood control works, the failure of which might be disastrous.

Underclearance. The lowest point of a bridge or other structure over or across a river, stream, or watercourse that limits the opening through which water flows. This is referred to as "low steel" in some regions.

AUTHORITY, ACKNOWLEDGEMENTS AND INTERPRETATION OF DATA

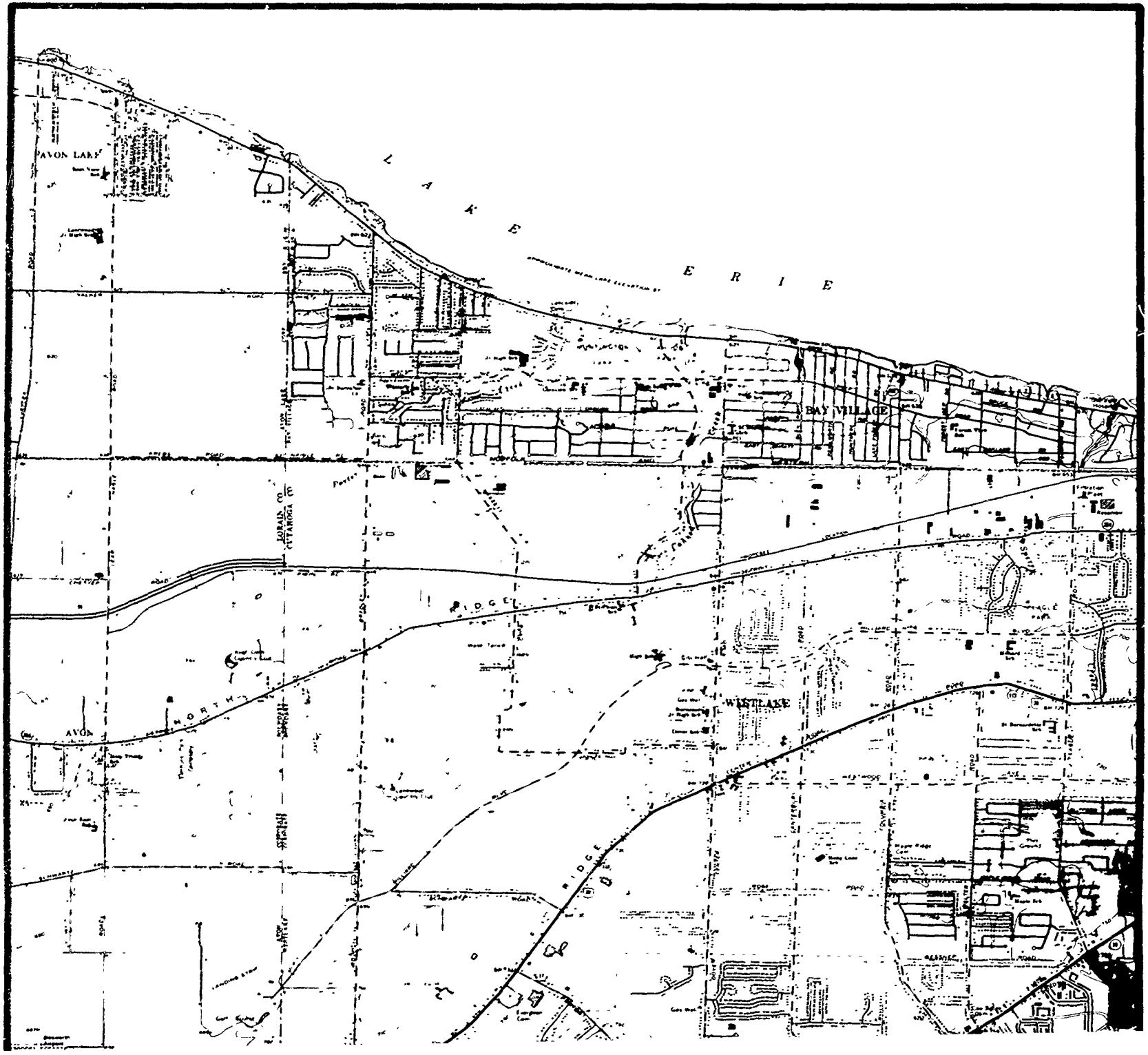
This report has been prepared by Burgess & Niple, Limited under the direction of the Buffalo District of the U.S. Army Corps of Engineers in accordance with the authority granted by Section 206 of the Flood Control Act of 1960 (PL 86-465) as amended.

* * *

Assistance and cooperation of federal, state and local agencies in supplying useful information is appreciated.

* * *

The Buffalo District will provide, upon request, interpretation and limited technical assistance in the application of these data, particularly as to their use in developing effective flood plain regulations. Requests should be coordinated through the Ohio Department of Natural Resources, Division of Planning. After local authorities have selected the flood magnitude or frequency to be used as the basis for regulation, further information on the effects of various widths of floodway on the profile of the selected flood can be provided to assist in final selection of floodway limits.


LAKE ERIE
AVON LAKE
BAY VILLAGE
WESTLAKE
AVON
RIDGE
RIDGE

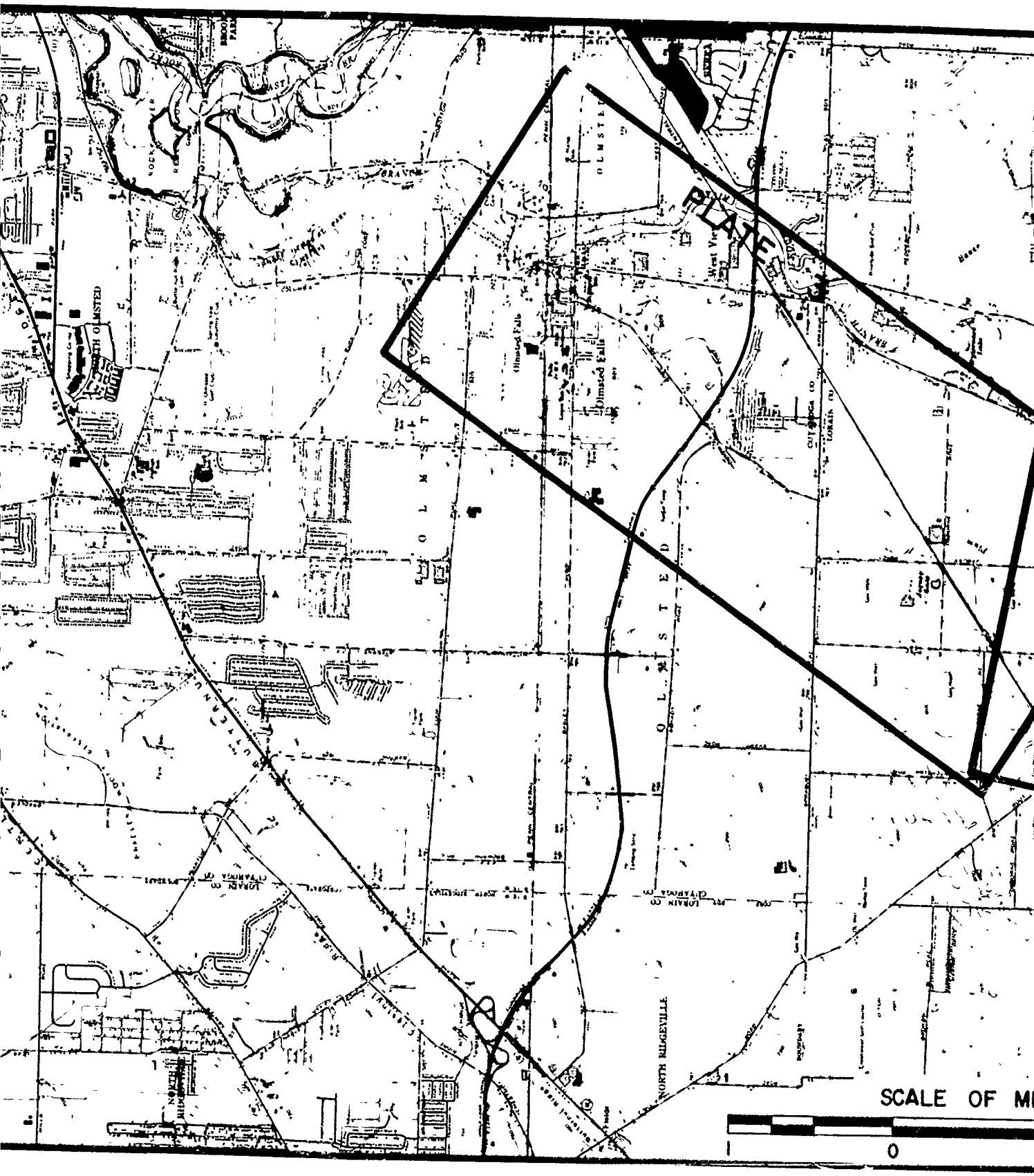
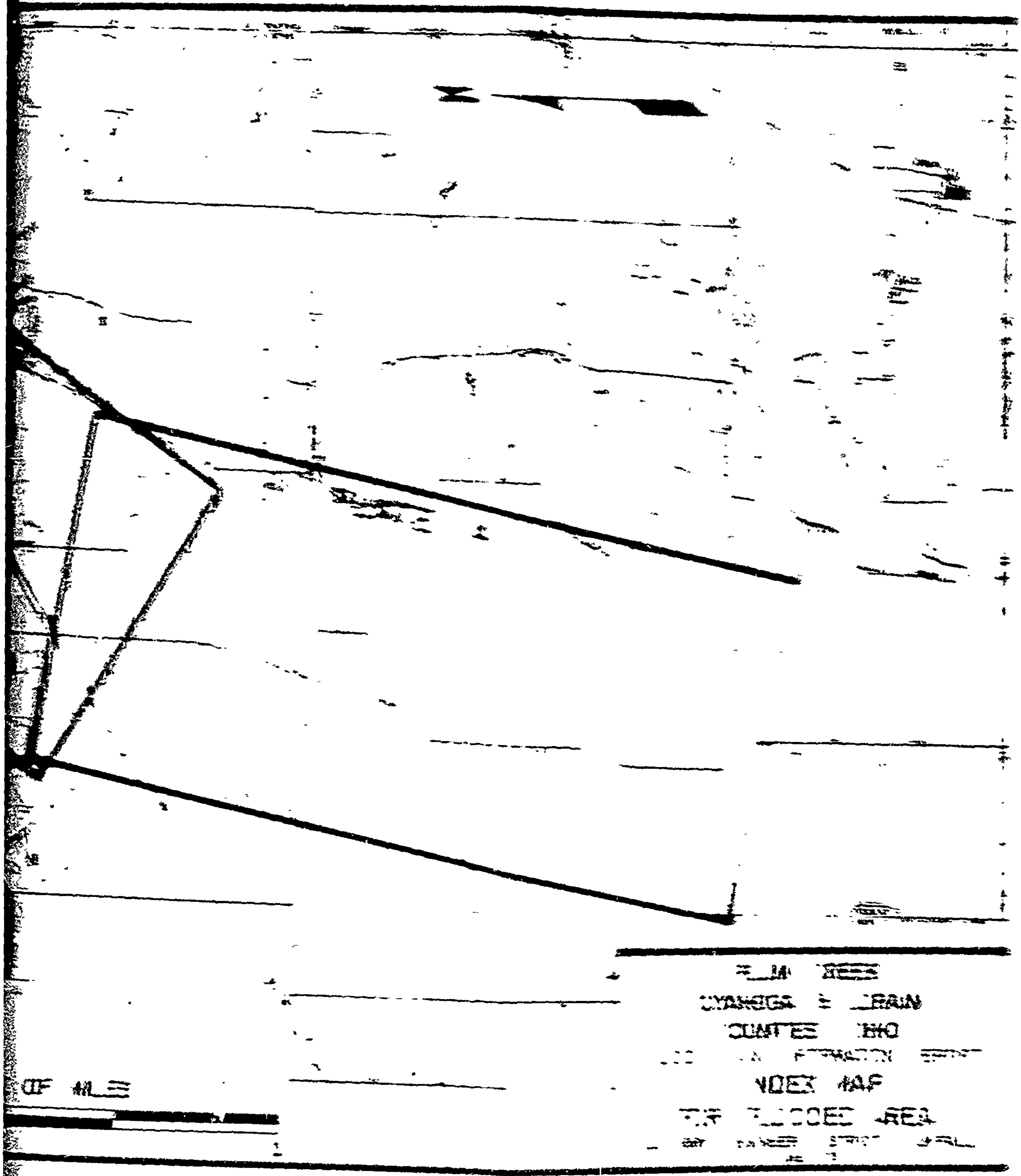
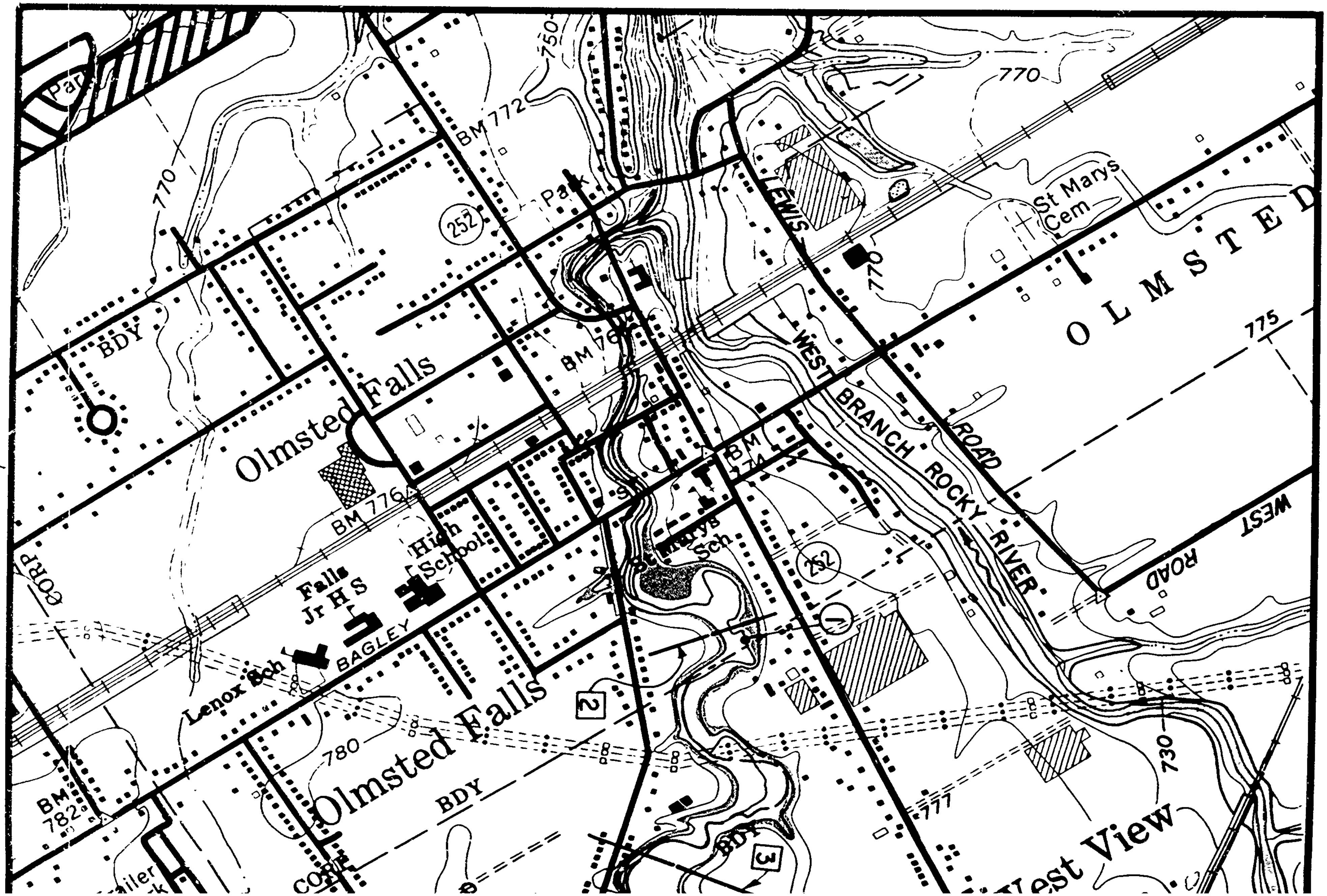
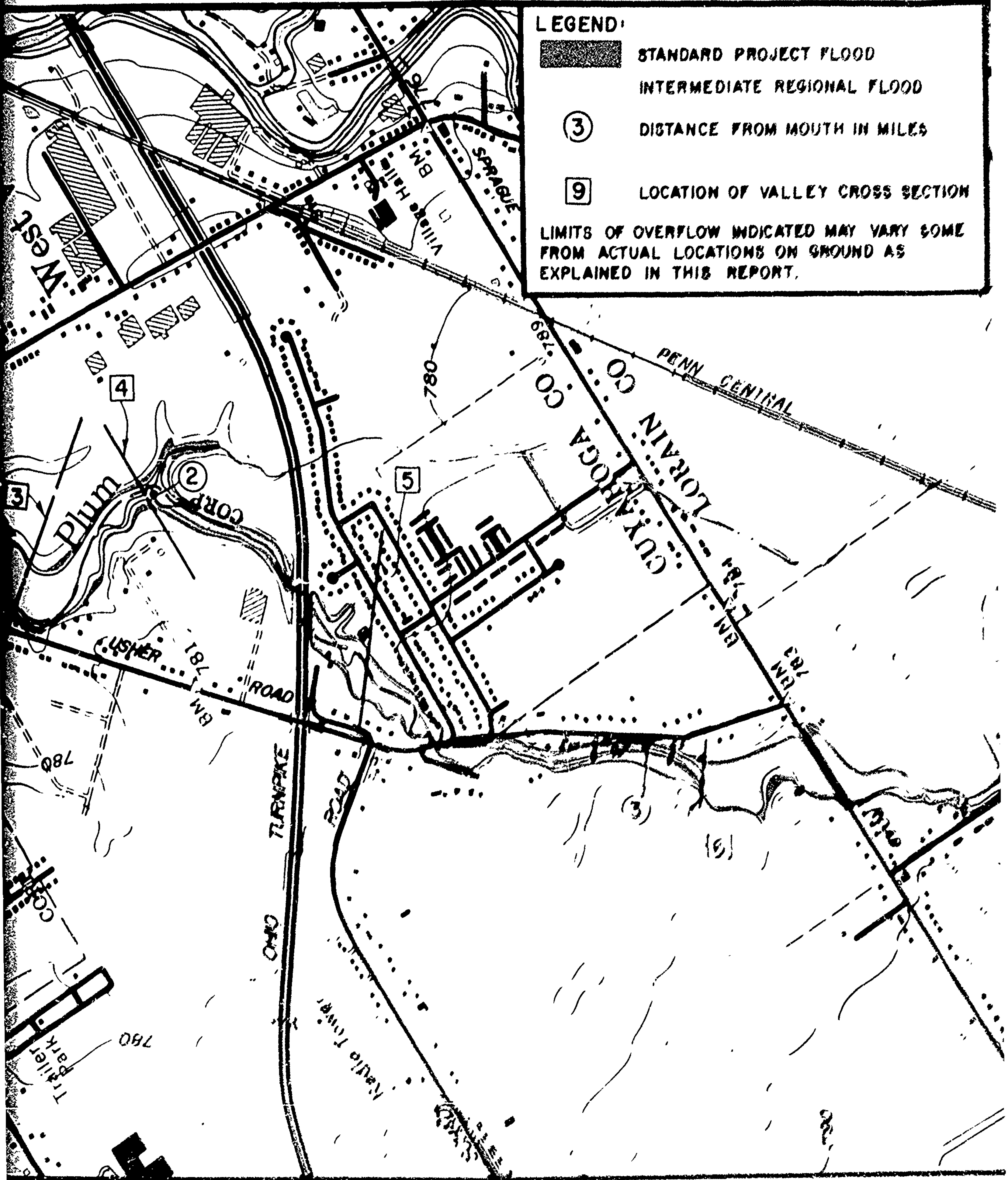


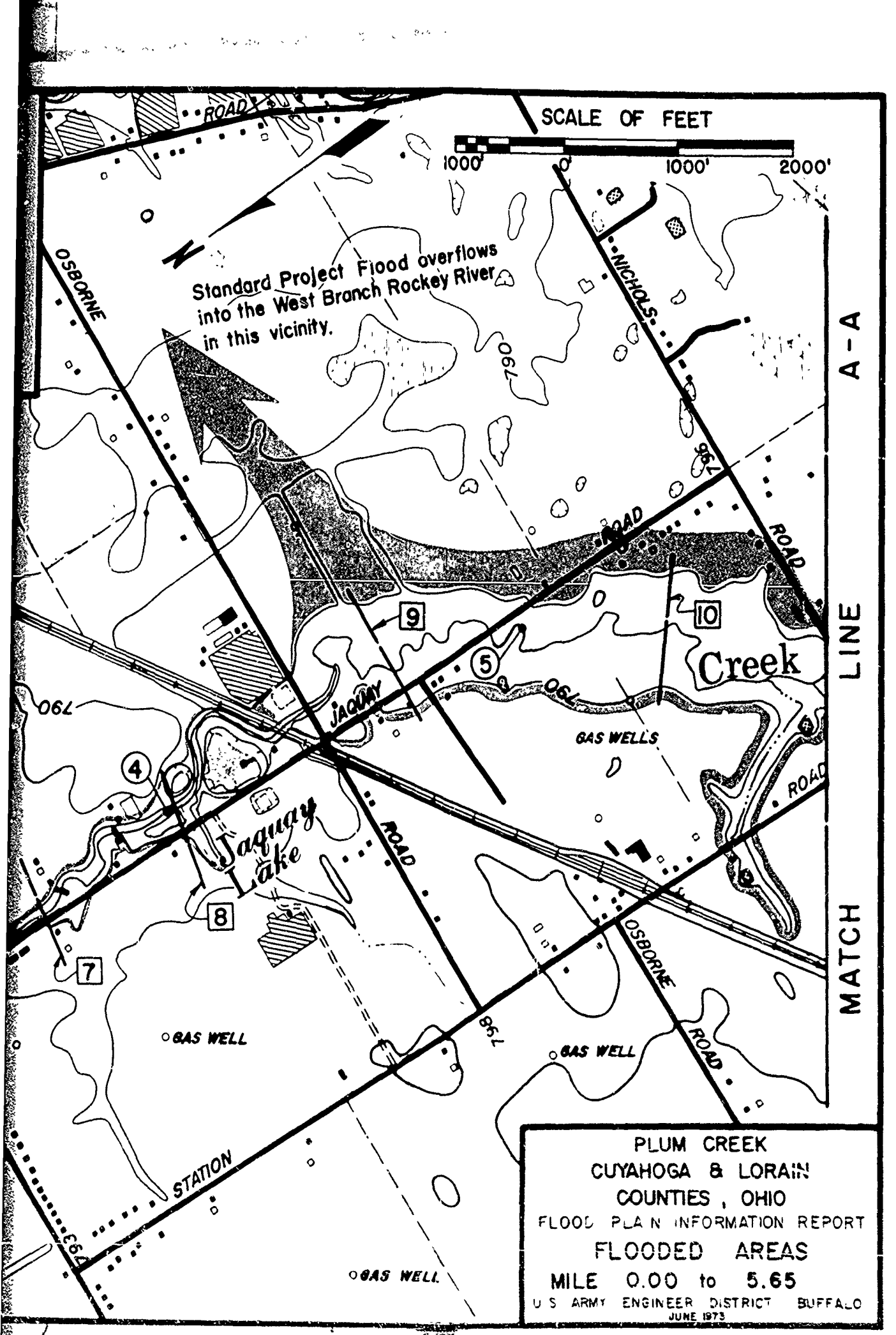
PLATE
OLMSTED
SCALE OF MI
0


COUNTIES OHIO
INDEX MAP



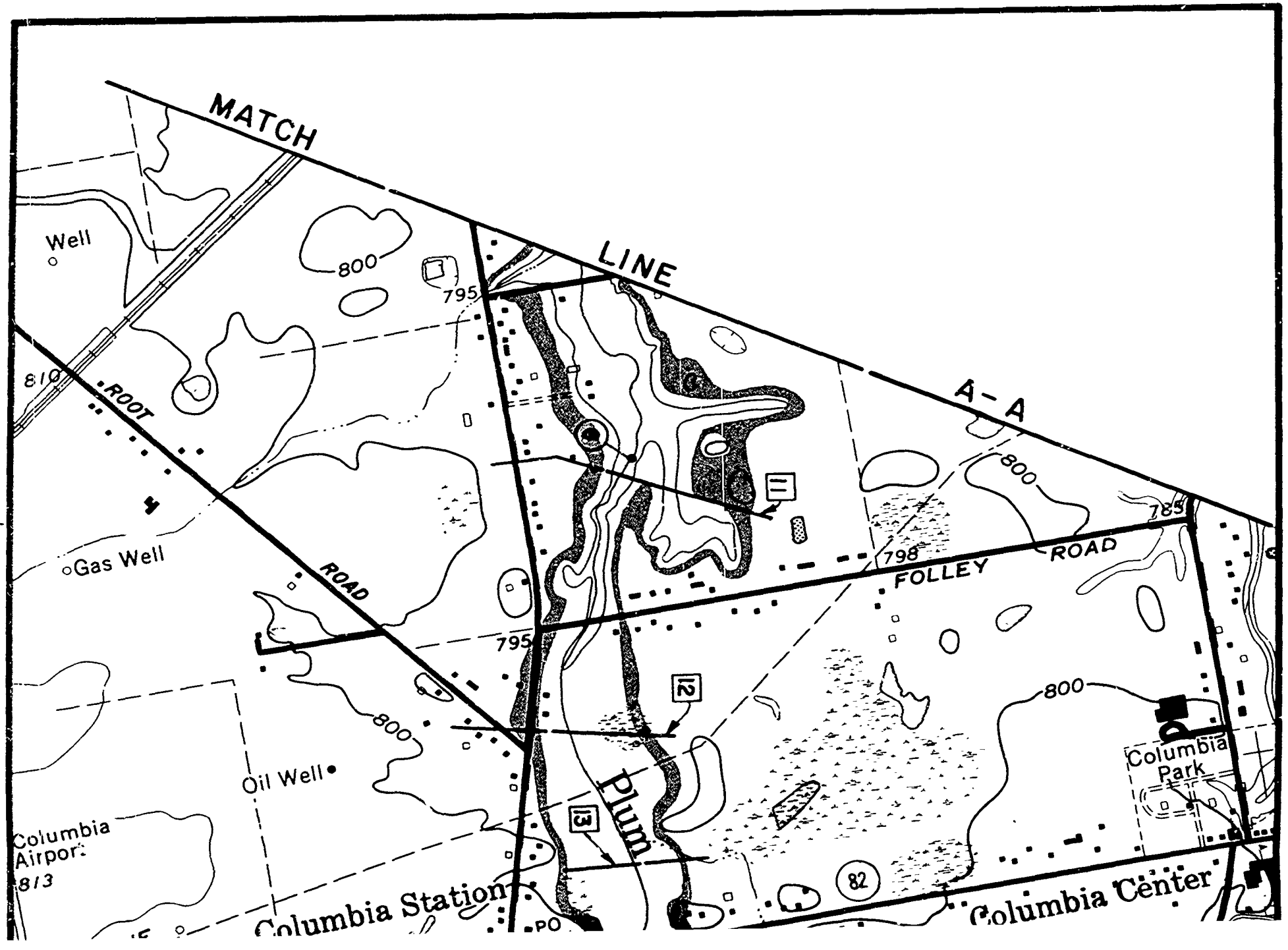
OLMSTED
St Marys Cem
LEWIS
WEST BRANCH ROCKY RIVER
ROAD
WEST ROAD
775
770
750
730
777
780
BM 772
BM 776
BM 782
252
Park
Olmsted Falls
St Marys Sch
High School
Falls Jr H S
BAGLEY
Lenox Sch
BDY
CORP
2
3
West View

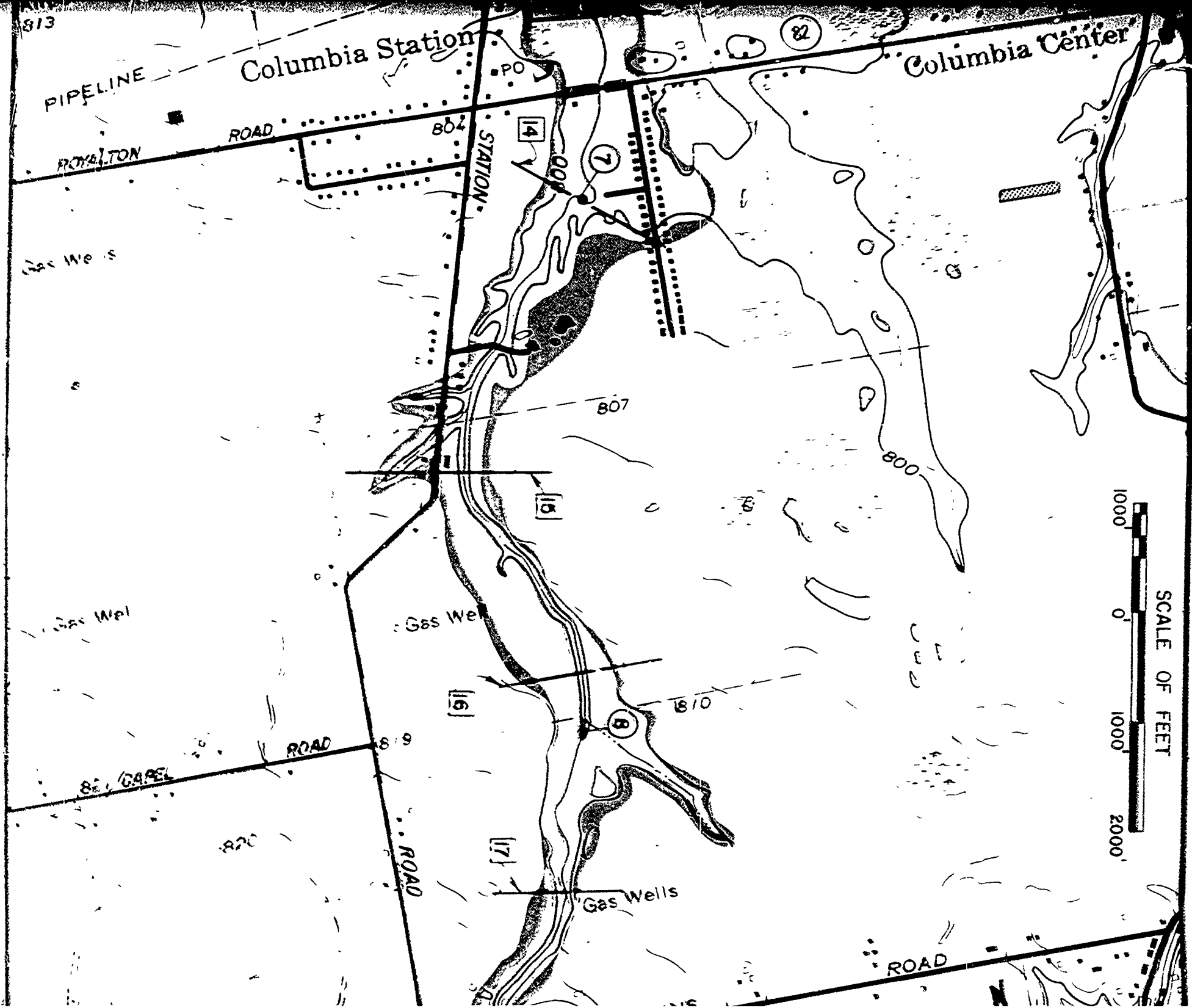

LEGEND:
STANDARD PROJECT FLOOD
INTERMEDIATE REGIONAL FLOOD
(3) DISTANCE FROM MOUTH IN MILES
[9] LOCATION OF VALLEY CROSS SECTION
LIMITS OF OVERFLOW INDICATED MAY VARY SOME FROM ACTUAL LOCATIONS ON GROUND AS EXPLAINED IN THIS REPORT.
West
Plum
CORP
SPRAGUE
PENN CENTRAL
CUYAHOGA CO
LORAIN CO
USHER ROAD
OHIO TURNPIKE
ROAD
780
781
789
783
Trailer park



PLUM CREEK
CUYAHOGA & LORAIN
COUNTIES, OHIO
FLOOD PLAIN INFORMATION REPORT
FLOODED AREAS
MILE 0.00 to 5.65
U S ARMY ENGINEER DISTRICT BUFFALO
JUNE 1973

PLATE 3


MATCH
LINE
A - A
Well
800
795
810
ROOT
ROAD
Gas Well
798
FOLLEY
ROAD
785
795
800
Oil Well
Columbia
Airport
813
Columbia Station
PO
Plum
Columbia
Park
82
Columbia Center


813
Columbia Station
PO
Columbia Center
PIPELINE
ROAD
804
STATION
14
7
800
807
800
15
Gas Wells
16
810
8
819
ROAD
820
17
Gas Wells
ROAD
ROAD
SCALE OF FEET
1000
0
1000
2000'

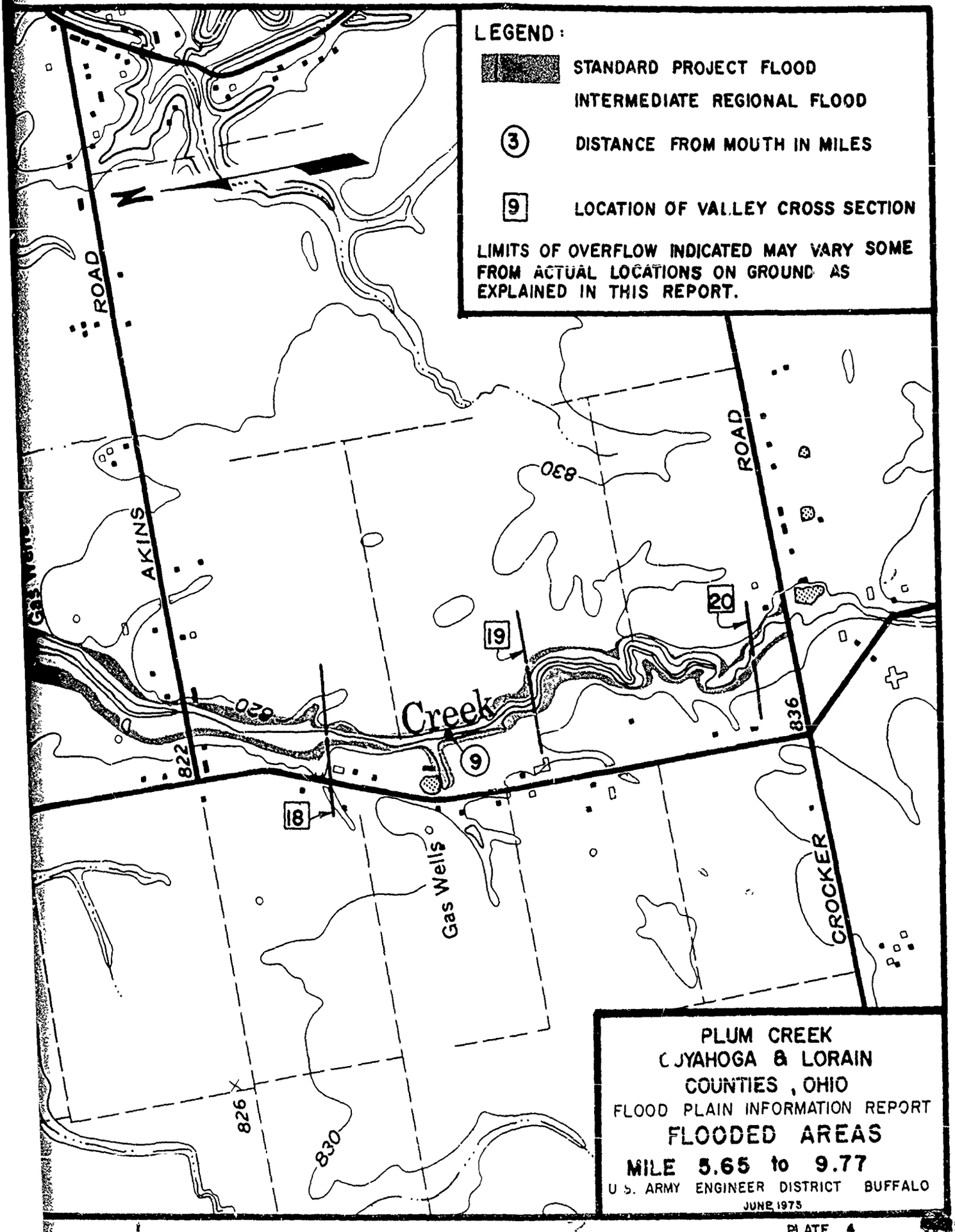
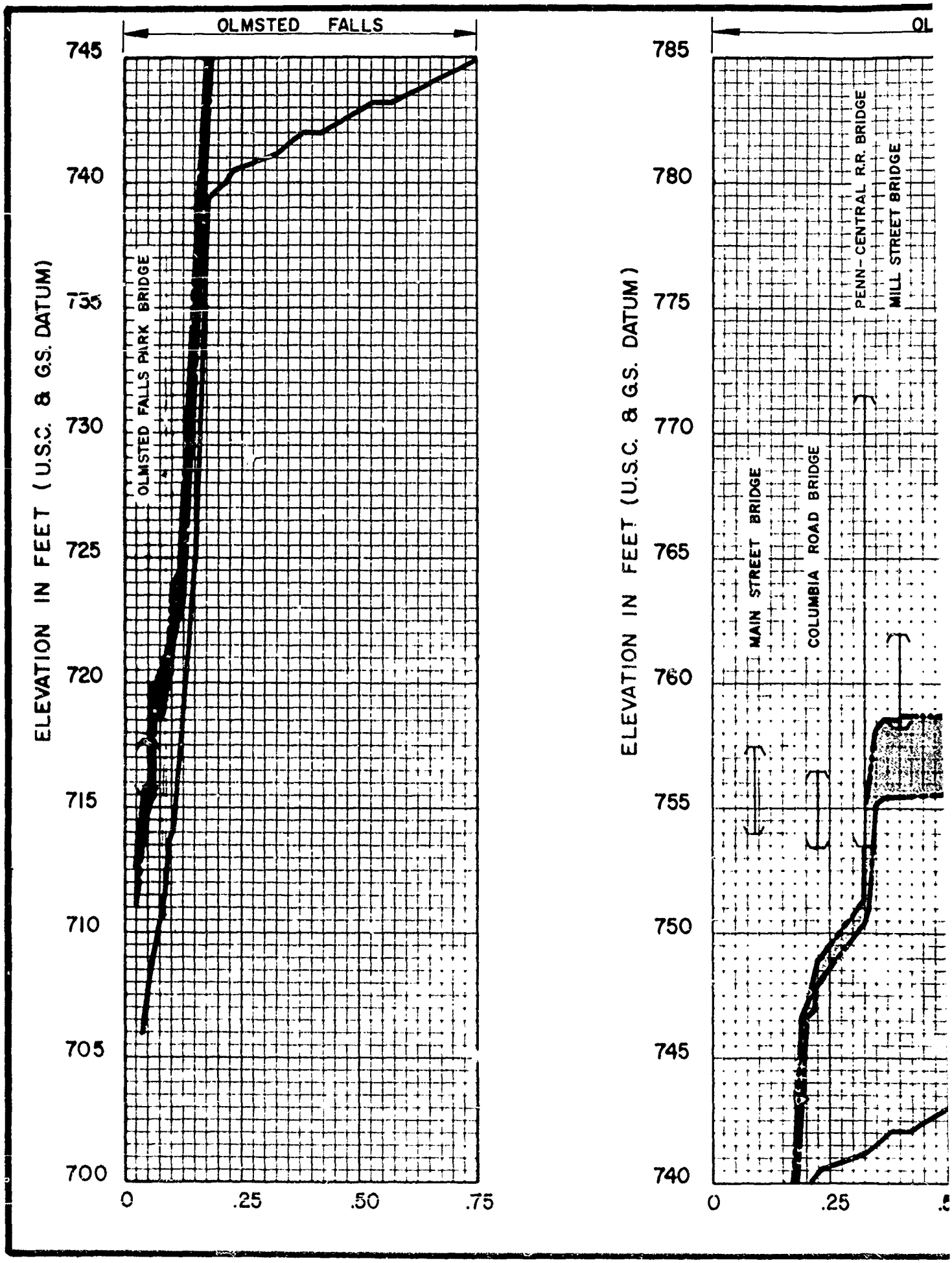
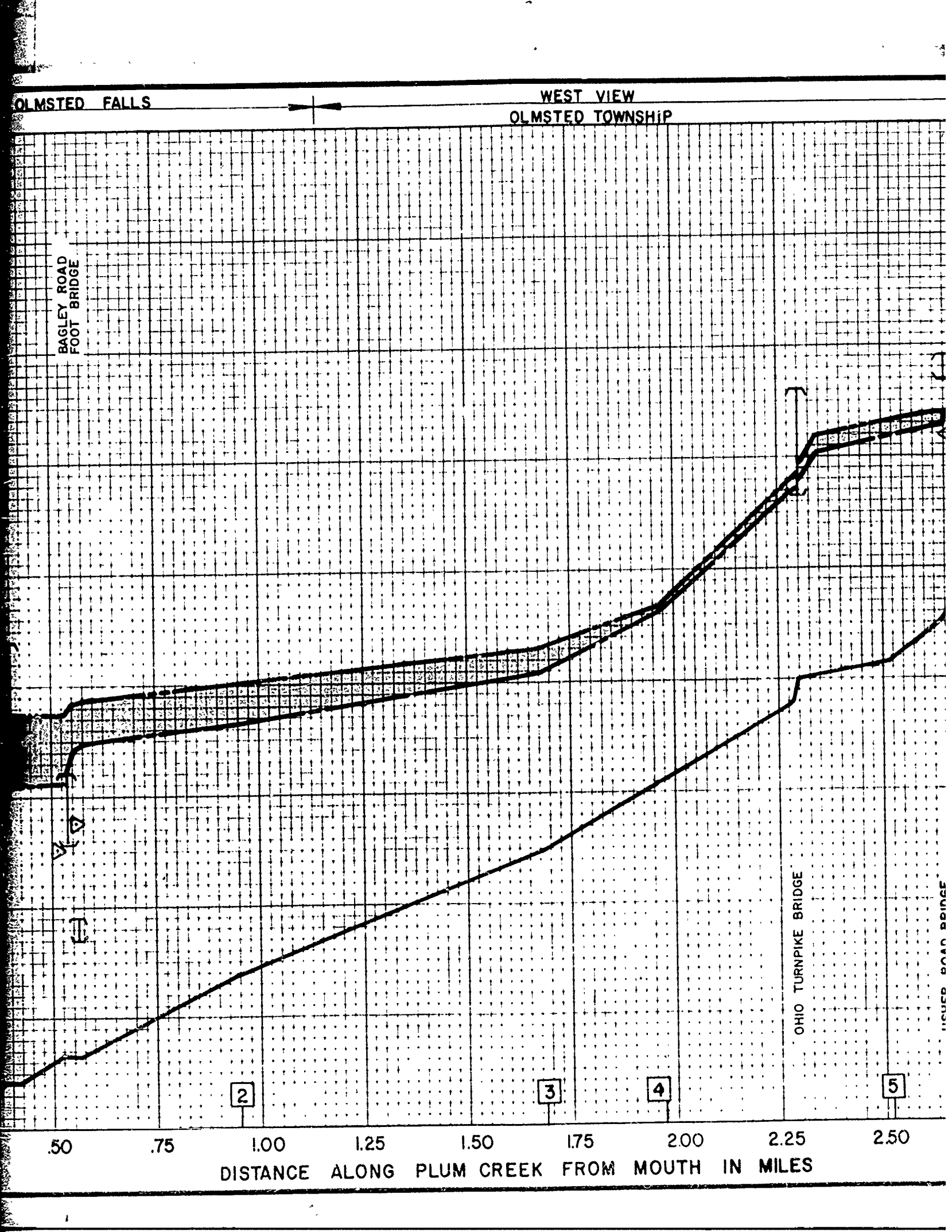
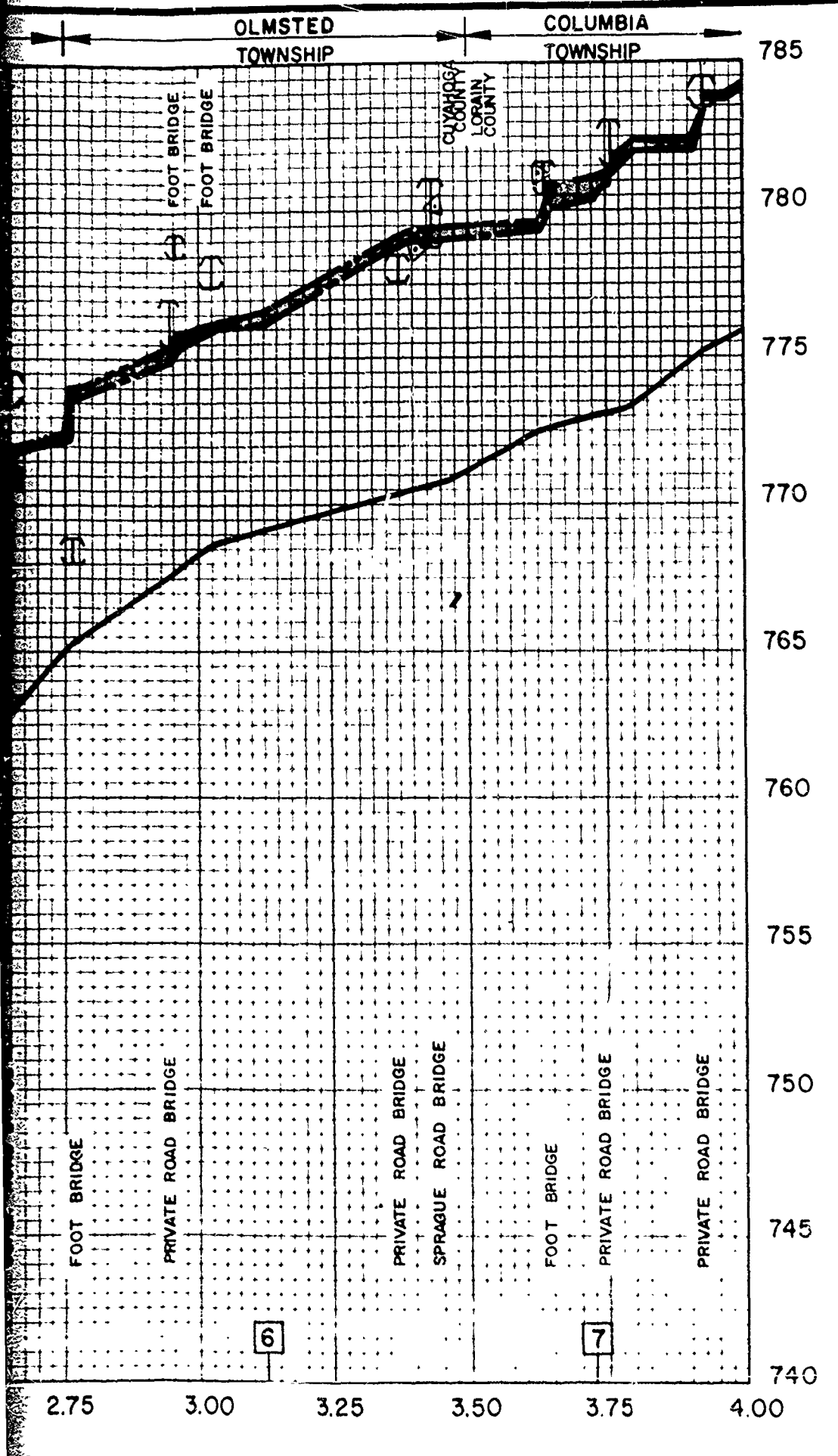

LEGEND:
STANDARD PROJECT FLOOD
INTERMEDIATE REGIONAL FLOOD
3 DISTANCE FROM MOUTH IN MILES
9 LOCATION OF VALLEY CROSS SECTION
LIMITS OF OVERFLOW INDICATED MAY VARY SOME FROM ACTUAL LOCATIONS ON GROUND AS EXPLAINED IN THIS REPORT.
N
ROAD
AKINS
ROAD
830
820
822
826
830
836
Creek
Gas Wells
CROCKER
18
19
20
9
PLUM CREEK
CUYAHOGA & LORAIN
COUNTIES, OHIO
FLOOD PLAIN INFORMATION REPORT
FLOODED AREAS
MILE 5.65 to 9.77
U.S. ARMY ENGINEER DISTRICT BUFFALO
JUNE 1975

PLATE 4


OLMSTED FALLS
OL
ELEVATION IN FEET (U.S.C. & G.S. DATUM)
745
740
735
730
725
720
715
710
705
700
0
.25
.50
.75
OLMSTED FALLS PARK BRIDGE
785
780
775
770
765
760
755
750
745
740
0
.25
PENN-CENTRAL R.R. BRIDGE
MILL STREET BRIDGE
MAIN STREET BRIDGE
COLUMBIA ROAD BRIDGE


OLMSTED FALLS
WEST VIEW
OLMSTED TOWNSHIP
BAGLEY ROAD
FOOT BRIDGE
OHIO TURNPIKE BRIDGE
2
3
4
5
.50
.75
1.00
1.25
1.50
1.75
2.00
2.25
2.50
DISTANCE ALONG PLUM CREEK FROM MOUTH IN MILES



LEGEND:

STANDARD PRO

INTERMEDIATE

APPROXIMATE

APPROXIMATE

APPROXIMATE

3 LOCATION OF

HIGH WATER
FLOOD

NOTES:

FLOOD PROFILES ARE BASE

1. EXISTING CHANNEL
2. EXISTING STRUCTUR
3. EXISTING CONDITION

LARGE SCALE FILLING W
UNLESS SUFFICIENT FLOOD

CU

FLOOD P

MIL

U.S. ARMY

D :

D PROJECT FLOOD

EDIATE REGIONAL FLOOD

MATE STREAM BED

MATE BRIDGE FLOOR ELEVATION

MATE LOW STEEL ELEVATION

N OF VALLEY CROSS SECTION

ATER MARKS OF SEP'. 17, 1972

E BASED ON THE FOLLOWING:

NNEL CONDITIONS

UCTURES

DITIONS OF DEVELOPMENT

ING WILL RAISE PROFILES

FLOODWAY IS PROVIDED

PLUM CREEK

CUYAHOGA & LORAIN

COUNTIES, OHIO

OD PLAIN INFORMATION REPORT

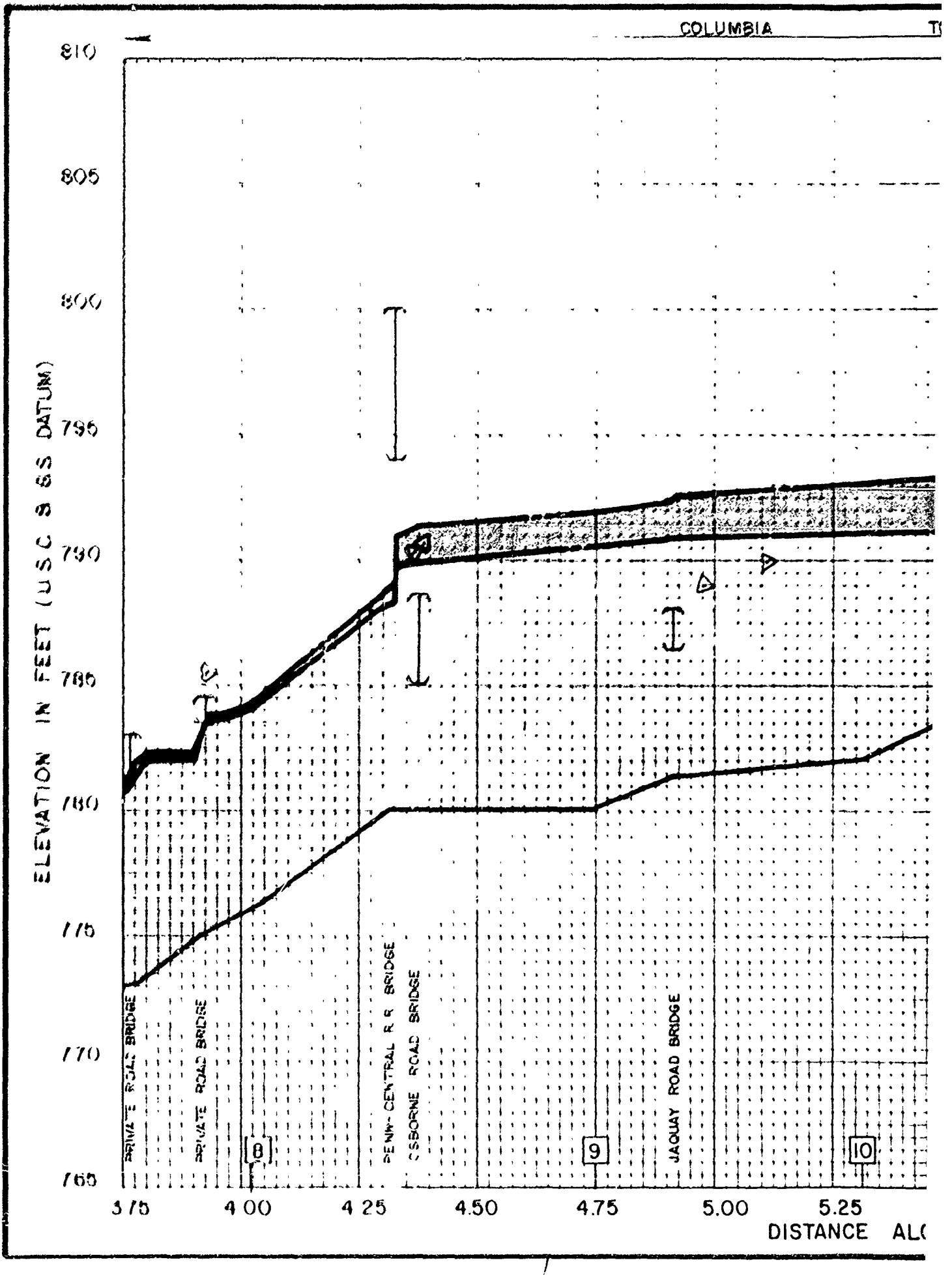
PROFILES

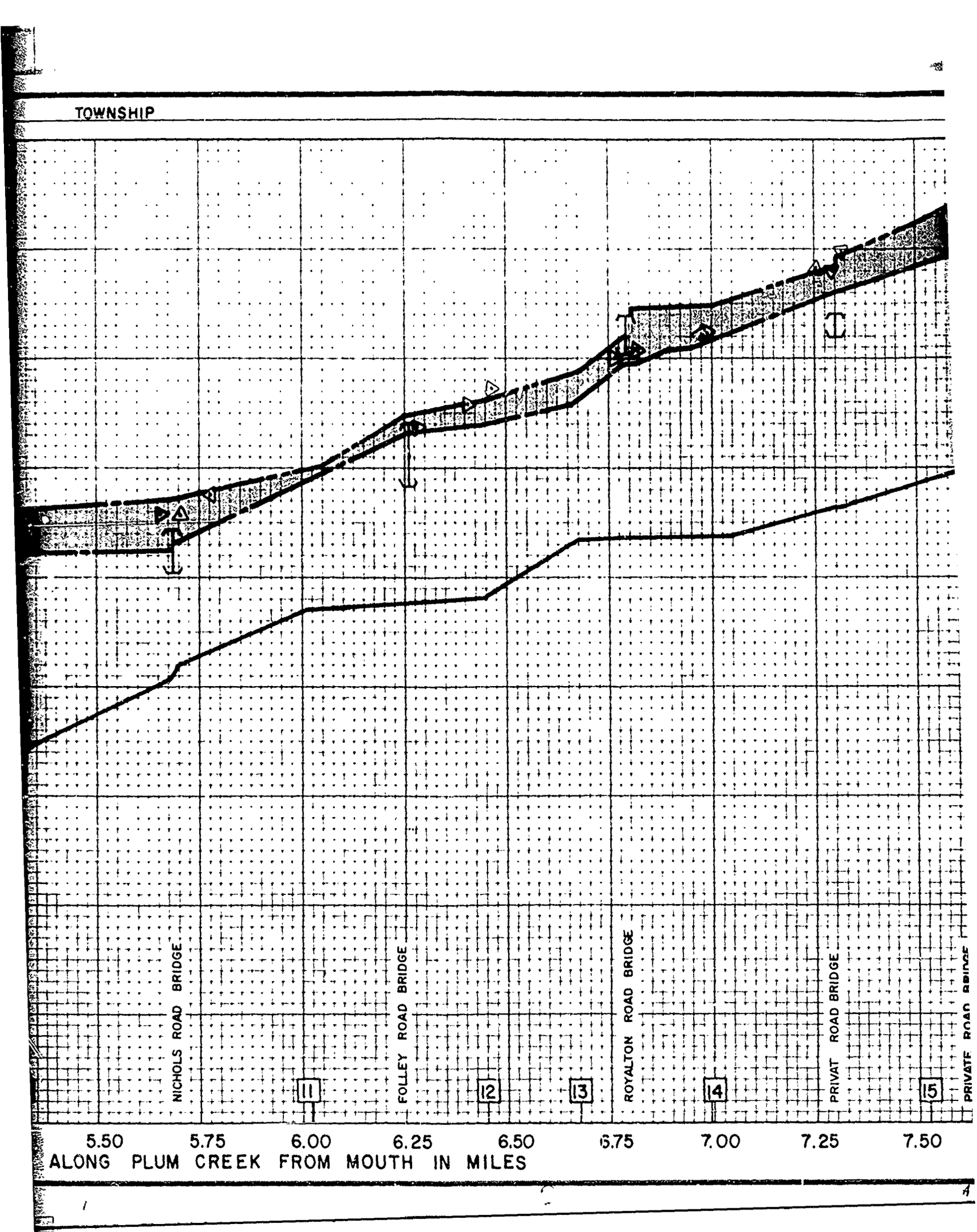
MILE 0.00 TO 4.00

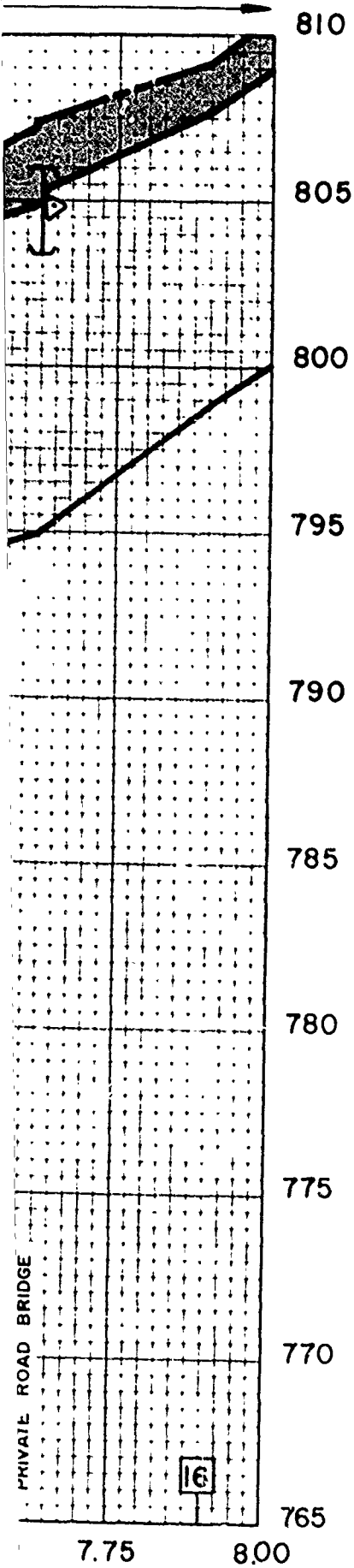
ARMY ENGINEER DISTRICT BUFFALO

JUNE 1972

PLATE 5


COLUMBIA
ELEVATION IN FEET (U S C & G S DATUM)
810
805
800
795
790
785
780
775
770
765
PRIVATE ROAD BRIDGE
PRIVATE ROAD BRIDGE
8
PENN-CENTRAL R R BRIDGE
OSBORNE ROAD BRIDGE
9
JAQUAY ROAD BRIDGE
10
3.75
4.00
4.25
4.50
4.75
5.00
5.25
DISTANCE


TOWNSHIP
NICHOLS ROAD BRIDGE
FOLLEY ROAD BRIDGE
ROYALTON ROAD BRIDGE
PRIVAT ROAD BRIDGE
PRIVATE ROAD BRIDGE
11
12
13
14
15
5.50
5.75
6.00
6.25
6.50
6.75
7.00
7.25
7.50
ALONG PLUM CREEK FROM MOUTH IN MILES



LEGEND:

STANDARD PROJECT FLOOD

INTERMEDIATE REGIONAL FLOOD

APPROXIMATE STREAM BED

APPROXIMATE BRIDGE FLOOR ELEVATION

APPROXIMATE LOW STEEL ELEVATION

3 LOCATION OF VALLEY CROSS SECTION

HIGH WATER MARKS FOR SEPT. 17, 1972 FLOOD

NOTES:

FLOOD PROFILES ARE BASED ON THE FOLLOWING:

1. EXISTING CHANNEL CONDITIONS
2. EXISTING STRUCTURES
3. EXISTING CONDITIONS OF DEVELOPMENT

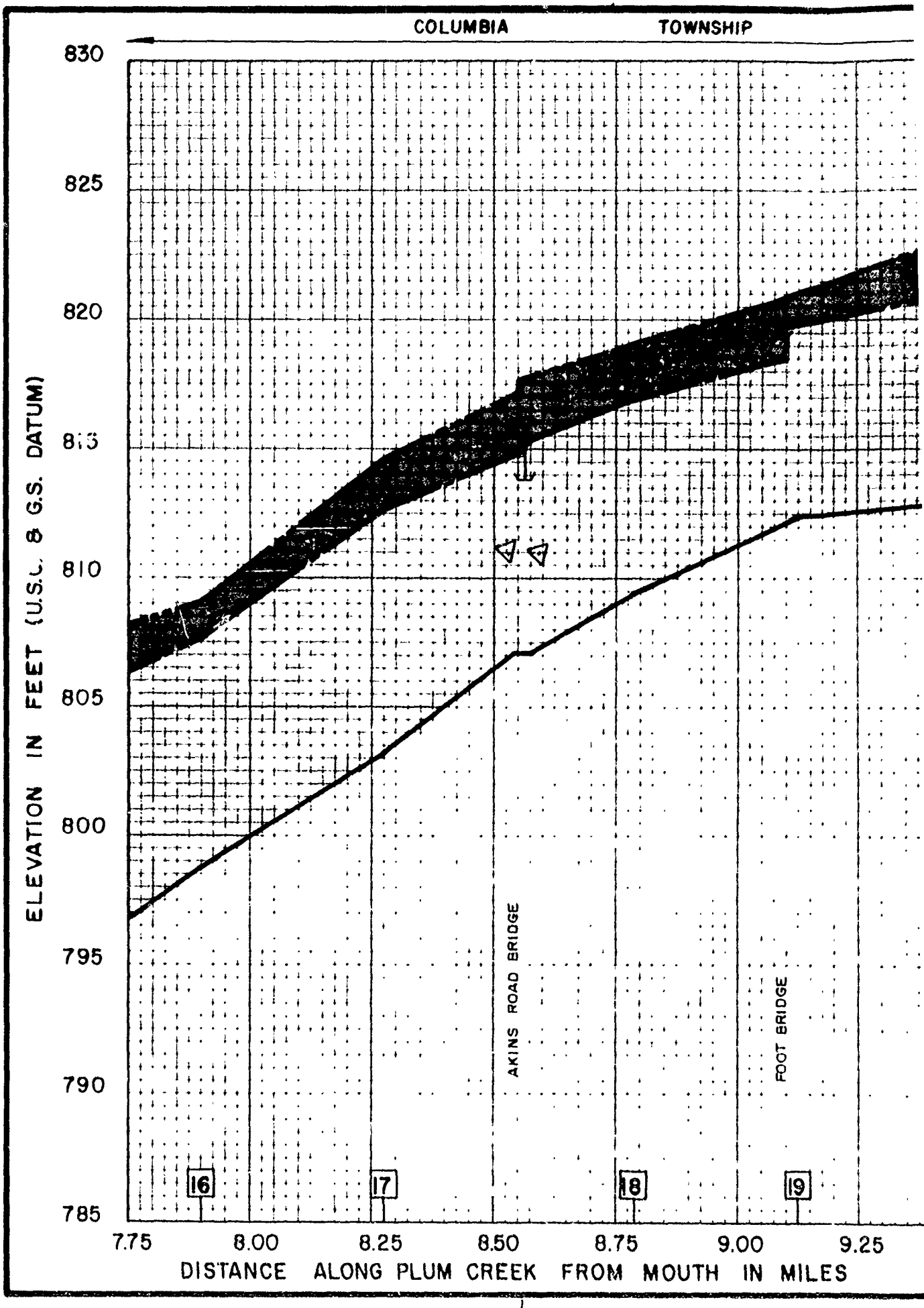
LARGE SCALE FILLING WILL RAISE PROFILES UNLESS SUFFICIENT FLOODWAY IS PROVIDED

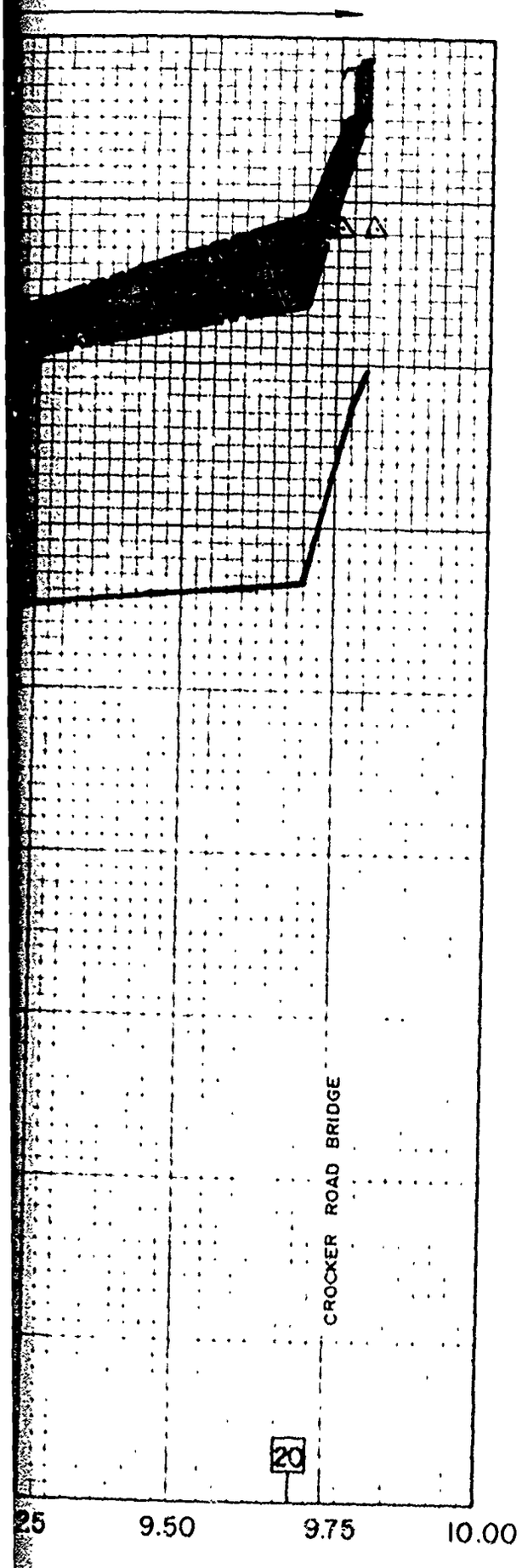
PLUM CREEK
CUYAHOGA & LORAIN COUNTIES, OHIO
FLOOD PLAIN INFORMATION REPORT
PROFILES
MILE 3.75 to 8.00

U. S. ARMY ENGINEER DISTRICT BUFFALO

JUNE, 1973

PLATE 6


COLUMBIA TOWNSHIP
830
825
820
815
810
805
800
795
790
785
ELEVATION IN FEET (U.S.C. & G.S. DATUM)
AKINS ROAD BRIDGE
FOOT BRIDGE
16
17
18
19
7.75
8.00
8.25
8.50
8.75
9.00
9.25
DISTANCE ALONG PLUM CREEK FROM MOUTH IN MILES



LEGEND:

STANDARD PROJECT FLOOD

INTERMEDIATE REGIONAL FLOOD

APPROXIMATE STREAM BED

APPROXIMATE BRIDGE FLOOR ELEVATION

APPROXIMATE LOW STEEL ELEVATION

3 — LOCATION OF VALLEY CROSS SECTION

△ — HIGH WATER MARKS FOR SEPT 17, 1972 FLOOD

NOTES:

FLOOD PROFILES ARE BASED ON THE FOLLOWING:

1. EXISTING CHANNEL CONDITIONS
2. EXISTING STRUCTURES
3. EXISTING CONDITIONS OF DEVELOPMENT

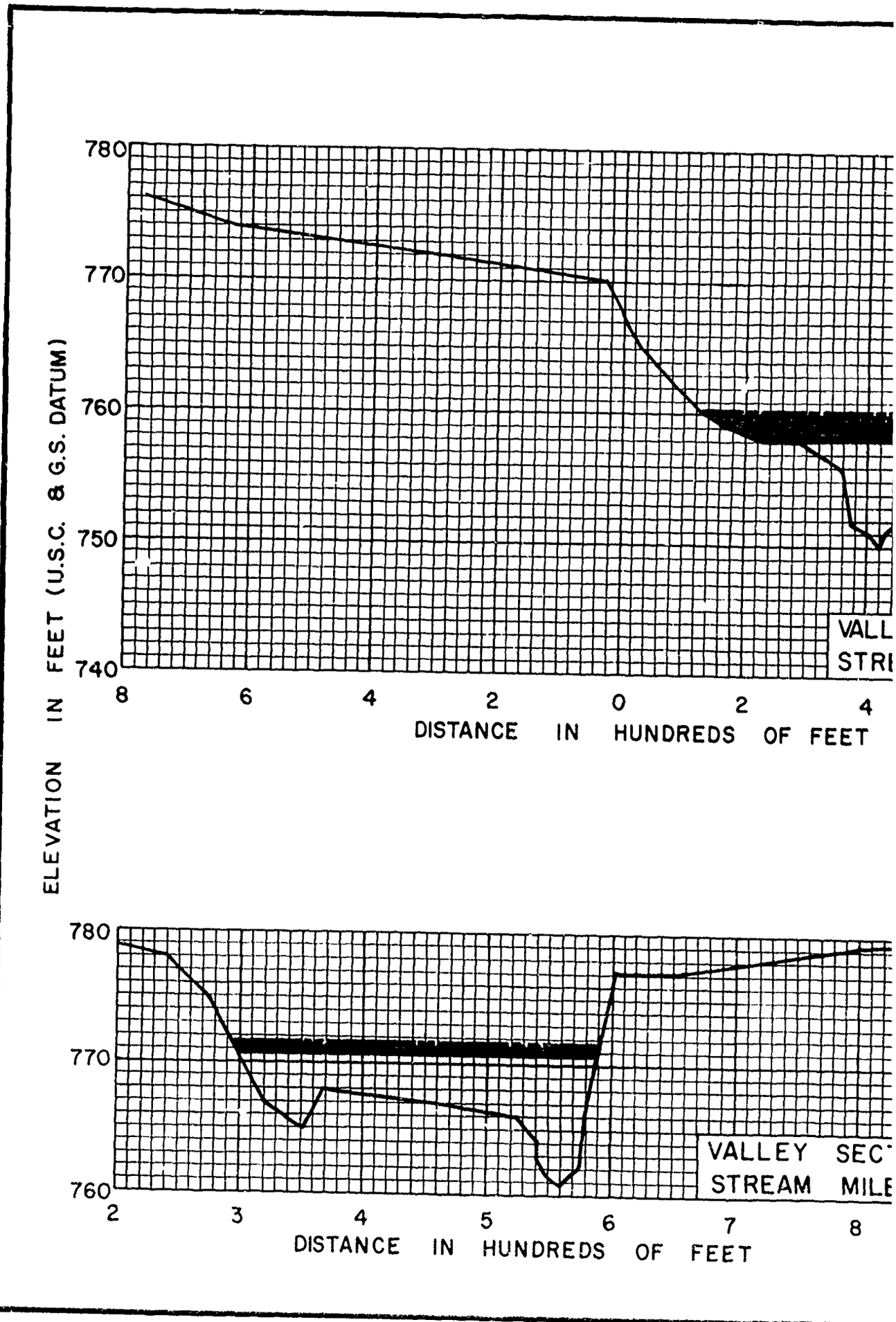
LARGE SCALE FILLING WILL RAISE PROFILES UNLESS SUFFICIENT FLOODWAY IS PROVIDED

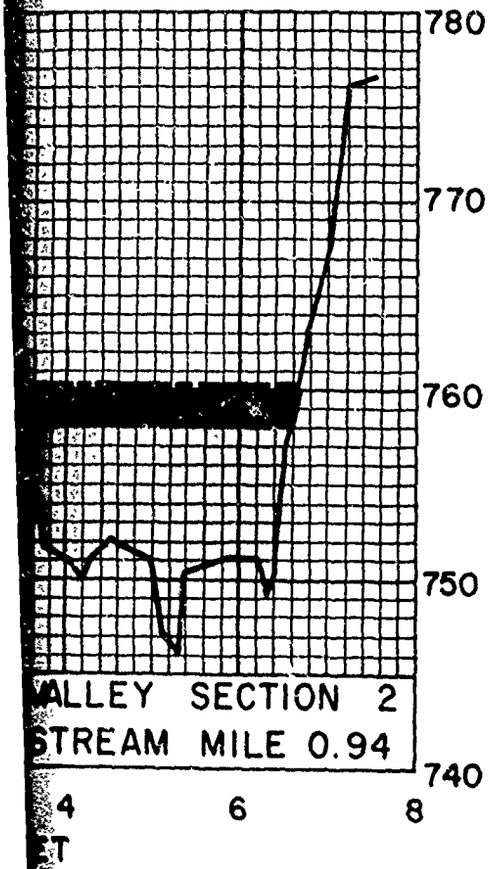
PLUM CREEK
CUYAHOGA & LORAIN COUNTIES, OHIO
FLOOD PLAIN INFORMATION REPORT
PROFILES
MILE 7.75 to 9.80

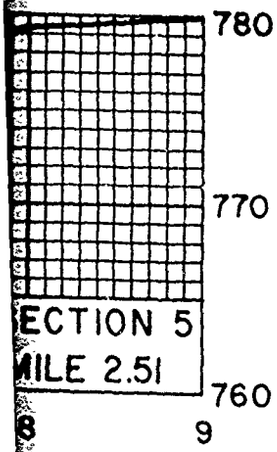
U S ARMY ENGINEER DISTRICT BUFFALO

JUNE 1973

PLATE 7


780
770
760
750
740
ELEVATION IN FEET (U.S.C. & G.S. DATUM)
8
6
4
2
0
2
4
DISTANCE IN HUNDREDS OF FEET
VALL
STRI
780
770
760
2
3
4
5
6
7
8
DISTANCE IN HUNDREDS OF FEET
VALLEY SEC
STREAM MILE





LEGEND :

STANDARD PROJECT FLOOD

INTERMEDIATE REGIONAL FLOOD

APPROXIMATE GROUND SURFACE

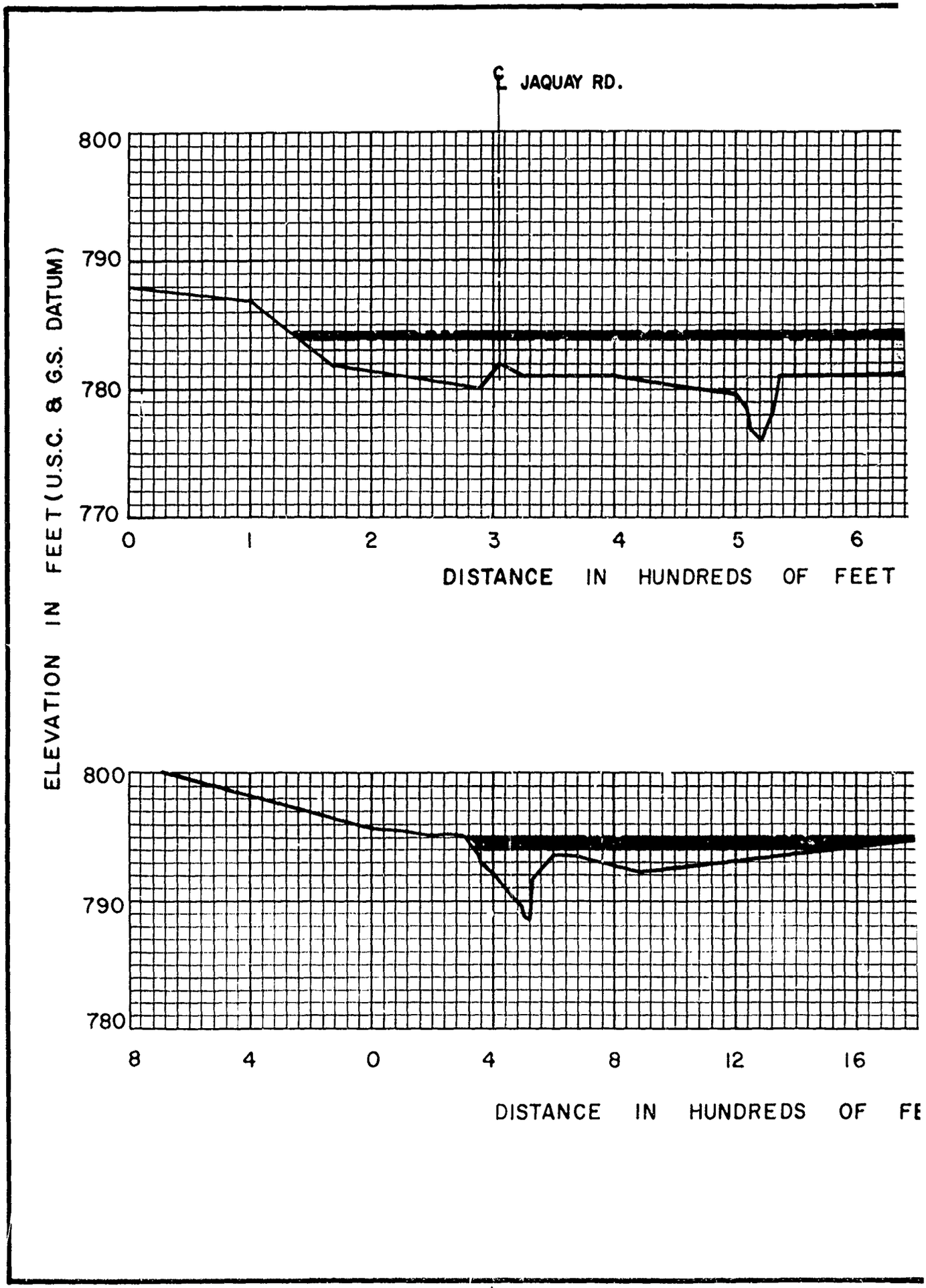
NOTES :

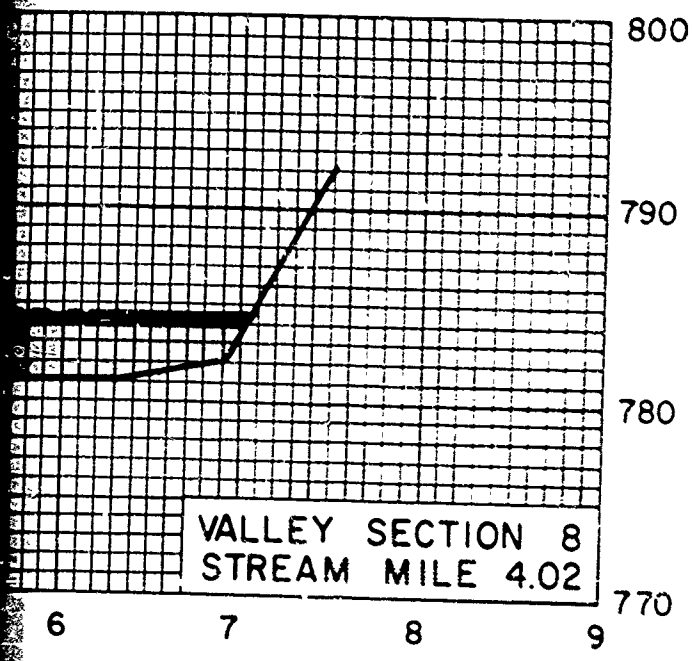
VALLEY CROSS SECTIONS ARE BASED ON ACTUAL FIELD SURVEYS, AND U.S. GEOLOGICAL QUADRANGLE MAPS.

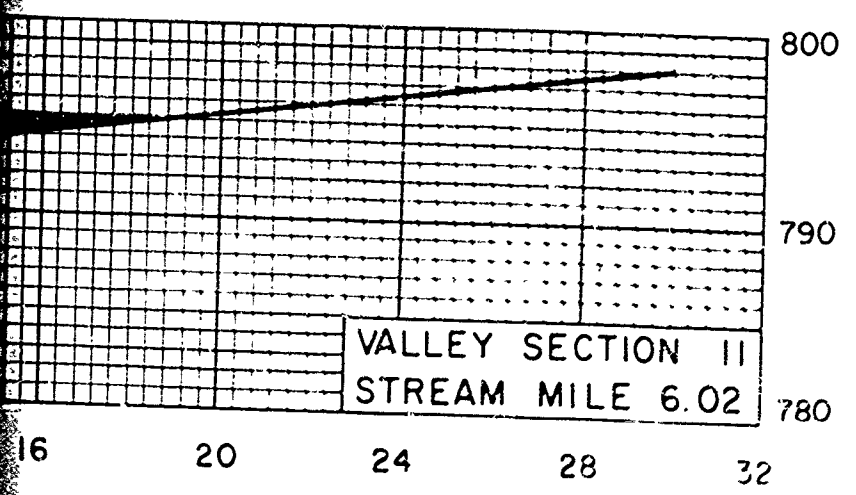
VALLEY CROSS SECTIONS ARE LOOKING DOWNSTREAM AND ARE LOCATED ON PLATE 3.

PLUM CREEK
CUYAHOGA & LORAIN
COUNTIES, OHIO
FLOOD PLAIN INFORMATION STUDY
VALLEY CROSS SECTIONS
2 & 5
U S ARMY ENGINEER DISTRICT BUFFALO

PLATE 8


℄ JAQUAY RD.
800
790
780
770
0
1
2
3
4
5
6
DISTANCE IN HUNDREDS OF FEET
ELEVATION IN FEET (U.S.C. & G.S. DATUM)
800
790
780
8
4
0
4
8
12
16
DISTANCE IN HUNDREDS OF FE





STANDARD PROJECT FLOOD

INTERMEDIATE REGIONAL FLOOD

APPROXIMATE GROUND SURFACE

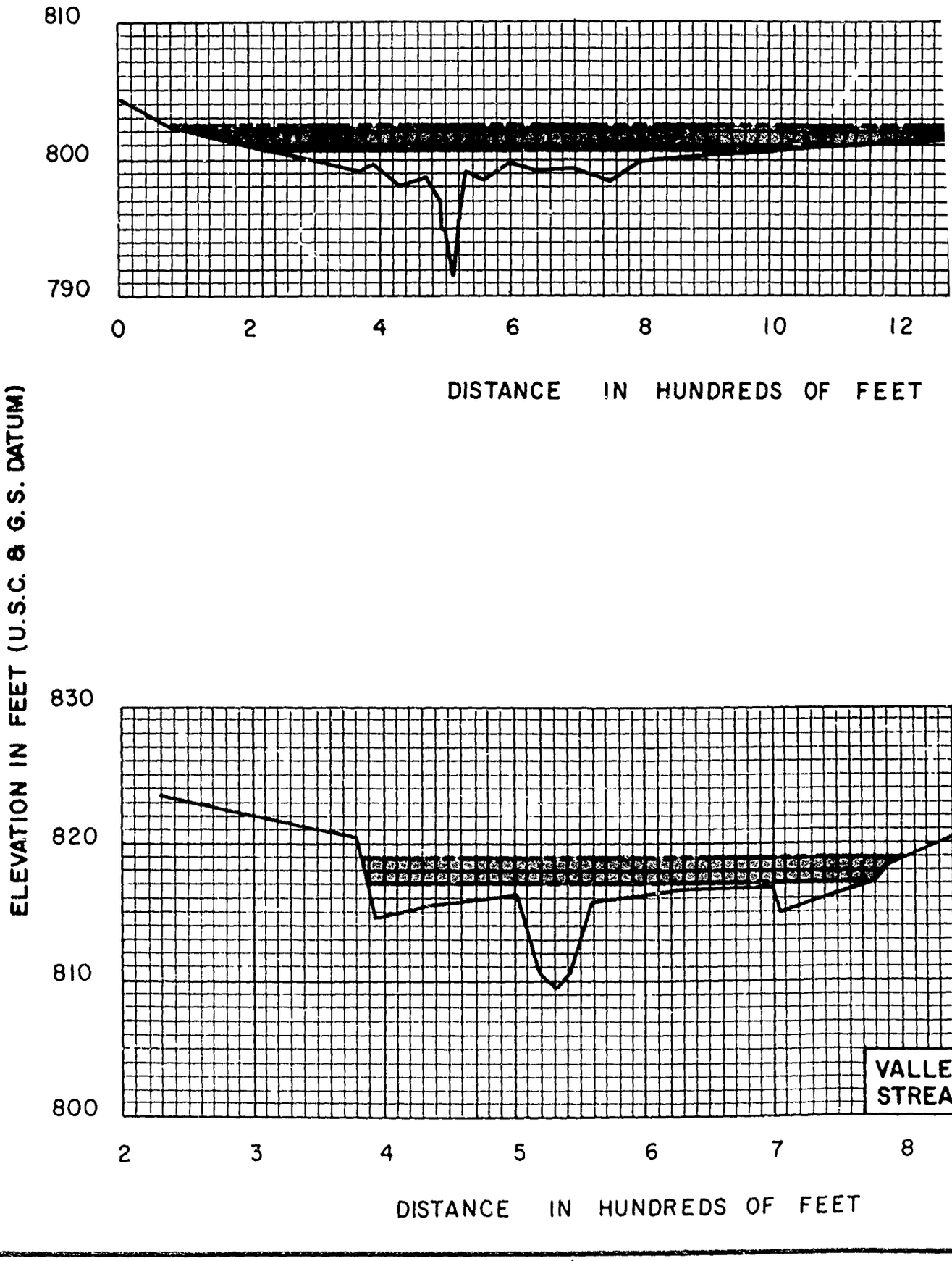
NOTES

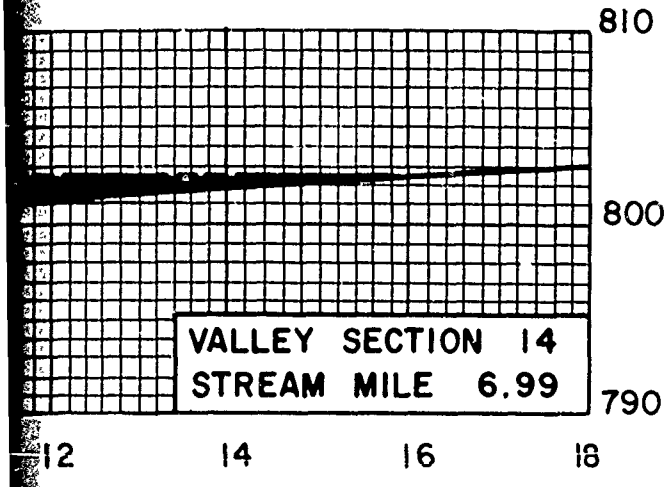
VALLEY CROSS SECTIONS ARE BASED ON ACTUAL FIELD SURVEYS AND U.S. GEOLOGICAL QUADRANGLE MAPS

VALLEY CROSS SECTIONS ARE LOOKING DOWNSTREAM AND ARE LOCATED ON PLATES 3 AND 4

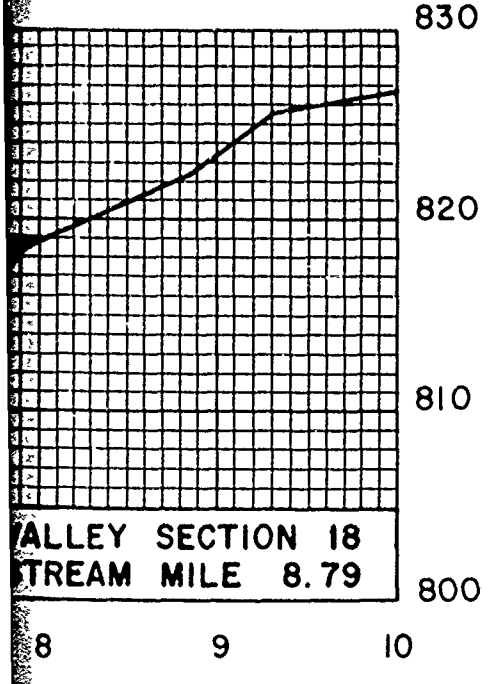
FLOW CREEK
DUWAMISH & GREEN
COUNTIES OHIO
FLOOD PLAIN INFORMATION STUDY
VALLEY CROSS SECTIONS
8 & 11
U.S. ARMY ENGINEER DISTRICT SEATTLE

PLATE 5


810
800
790
0
2
4
6
8
10
12
DISTANCE IN HUNDREDS OF FEET
ELEVATION IN FEET (U.S.C. & G.S. DATUM)
830
820
810
800
VALLEY STREAM
2
3
4
5
6
7
8
DISTANCE IN HUNDREDS OF FEET



EET



LEGEND :

STANDARD PROJECT FLOOD

INTERMEDIATE REGIONAL FLOOD

APPROXIMATE GROUND SURFACE

NOTES :

VALLEY CROSS SECTIONS ARE BASED ON ACTUAL FIELD SURVEYS, AND U.S. GEOLOGICAL QUADRANGLE MAPS.

VALLEY CROSS SECTIONS ARE LOOKING DOWNSTREAM AND ARE LOCATED ON PLATE 4.

PLUM CREEK
CUYAHOGA & LORAIN
COUNTIES, OHIO
FLOOD PLAIN INFORMATION REPORT
VALLEY CROSS SECTIONS
14 & 18
U.S ARMY ENGINEER DISTRICT BUFFALO